Introducing the
Titanium Pro ICT Series
Path to Peak Performance

IDI

CATALOG & SOURCE BOOK

SIXTH EDITION

Earning Our Leadership at Every Point of Contact.

From the Desk of Ed Schifman, President, IDI

Dear Customer,

What a way to begin our 21st year in the probe industry! We were rated the top ATE vendor for contacts and probes by the readers of Test and Measurement World Magazine! And when the magazine just released its 2000 Brand Preference Study, the most preferred and most recognized probe brand is IDI. That's two straight ranking us number one!

Obviously we're flattered. Recognition like this is gratifying and we've received our share of it over the last few months. Our web site was voted among the Top 200 business-to-business web sites in the nation by Advertising Age's Business Marketing Magazine. Our newest revolution in probe design, the bifurcated ICT™ Probe Series, was voted one of the Top 10 Test Products of the year by Test and Measurement World's Best In Test Award. All these accolades from the industry are appreciated, and they help us monitor if we're on course toward our customer satisfaction goals.

Our sales force. The people who bring you IDI leadership.

Our Outside Sales Force, left to right: Anne Bush, Bill Oxley, Thad Sketers, Ed Schifman, and Marc Crecco

But it is not our culture at IDI to rest on our laurels. The ingenuity of our people continues to amaze me. And, with this catalog, IDI continues to usher in the new era of probe technology begun by the ICT Probe Series. On page 42 of this catalog, we introduce the next generation of ICT Probes: The new Titanium Pro ICT Series. With an advanced, proprietary metallurgy, it provides the strongest probe plating on the market, with a hardness of over 400 knoop. Taking the principle of bifurcation to new heights, the Ti-Pro ICT Series has again raised the bar for accuracy, reliability and cost of ownership for in-circuit testing. As the Ti-Pro ICT Series defines the future of in-circuit testing, bias design won't just be obsolete, it will become extinct.

Yet, what drives our culture at IDI is something more than the plaques and awards I've mentioned. What drives our culture is you, our customer. Every point of contact with a customer is a moment of truth for us. It's when everything we do that makes us unique comes together–like our inventory of the industry's most extensive product line, or our exclusive ability to custom design and build a solution for any new application.

But sometimes the moment of truth for a customer is not when we deliver the right probe, but when we provide the right information they need to spec the right probe. When is the last time you surfed our award-winning web site? If it's been awhile, log on now and make us a bookmark. Use our new tools to help you specify, order, purchase, ship and track your probes. Learn more about our site on the following pages. If you don't have your personal password to our web site yet, call now to get it and record in the box below.

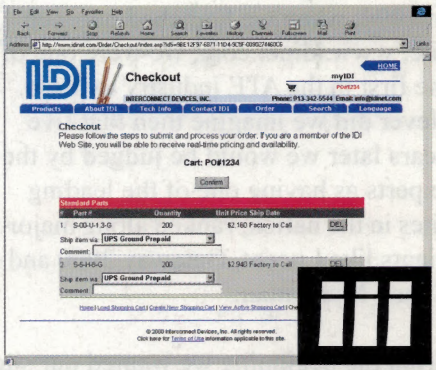
Thank you for rewarding us with your business!

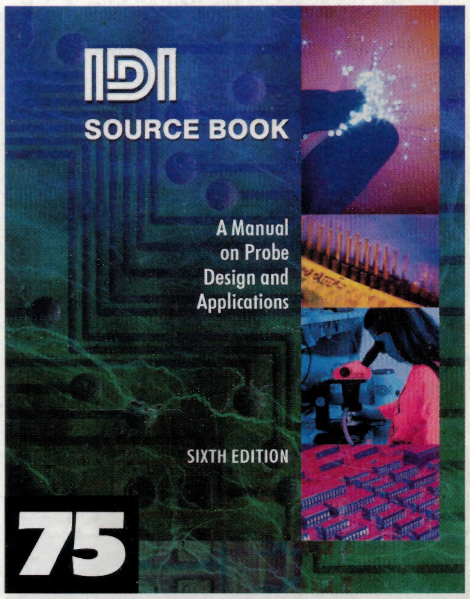
Ed Schifman
President

Your Login ID _____

Your IDI personal password _____

IDI Catalog Table of Contents



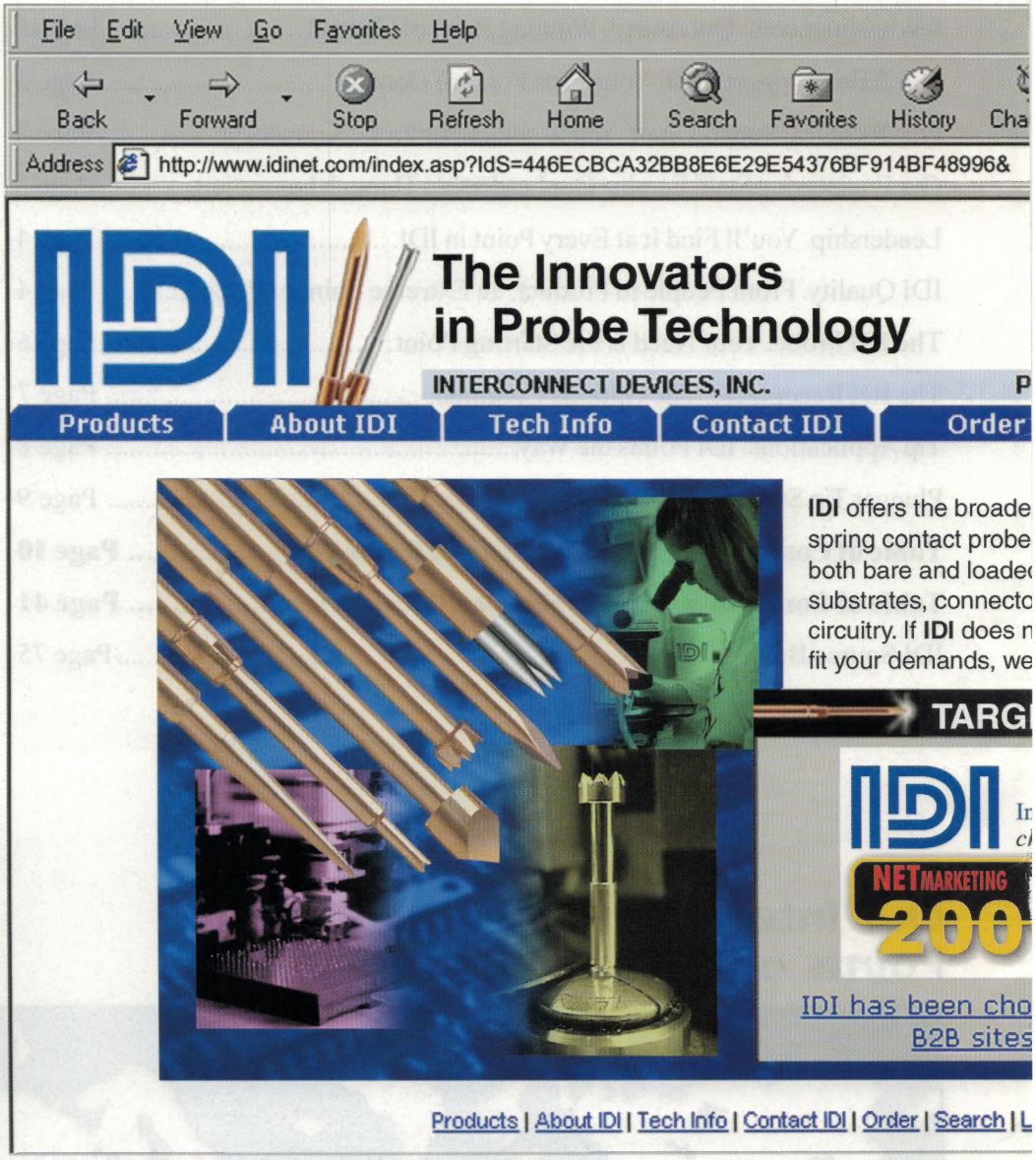


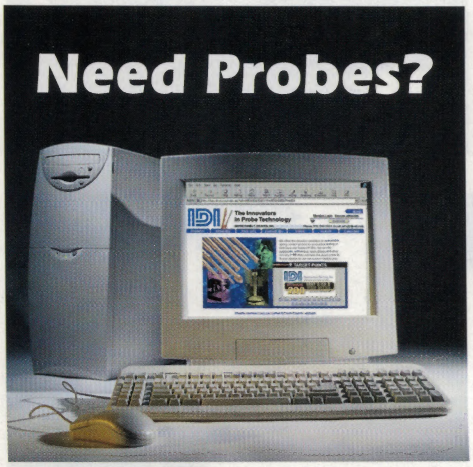
Our International Commitment. Points of Contact the World Over.

www.idinet.com
Our Award-Winning Point of Contact.

In 1994, when we launched our web site, www.idinet.com, we were one of the first in the ATE industry to do so. Never did we imagine then that five years later we would be judged by the experts as having one of the leading sites in the nation, ranked along major giants like Lucent, Gateway 2000 and Chase Manhattan.

From the beginning we wanted our site to be the user-friendly interactive tool that would make life easier for our customers. We committed the resources required to harness the new web technologies that could give our customers what they wanted as they became more sophisticated web users. Customer feedback has been positive along the way. Then, in August of 1999, we were delighted to learn that our site was voted as among the nation's best.





Find it...
Price it...
Order it...
Track it...
Receive it...

without leaving your chair.

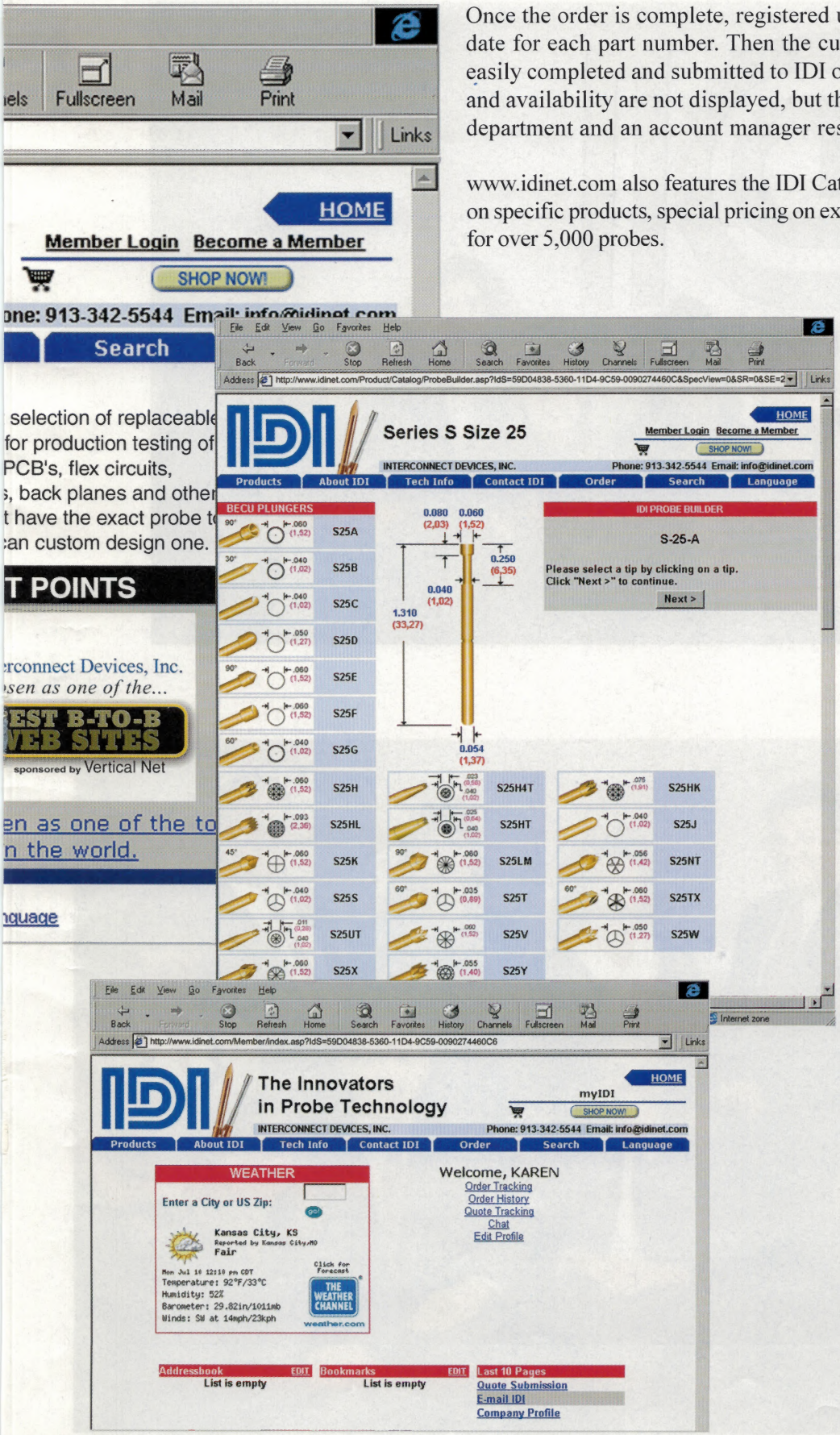
www.idinet.com

www.idinet.com was voted one of the Top 200 Business-to-Business Web Sites by Advertising Age's "Business Marketing Magazine" in a special report by Net Marketing, who specializes in providing education information on creating and running a web site. The Net Marketing judges considered various qualities of a web site's functionality and intent and then graded the web sites.

The depth to which a business customer can navigate was one important criteria. www.idinet.com features an e-commerce system that accommodates both registered customers and non-registered customers. The e-commerce system lets the user manually type in the part number, or the part number can be built by selecting links for the desired features, like tip style, spring force, plating, etc., from the appropriate catalog page.

Once the order is complete, registered users may review the price and ship date for each part number. Then the customer's purchase order may be easily completed and submitted to IDI online. For non-registered users, price and availability are not displayed, but the order is e-mailed to the IDI sales department and an account manager responds to the request promptly.

www.idinet.com also features the IDI Catalog and Source Book, technical papers on specific products, special pricing on excess inventory and individual spec sheets for over 5,000 probes.



Log on www.idinet.com now and see these award-winning features for yourself:

- Place orders on-line seamlessly
- Review all your purchases
- Track your order through UPS
- Check quantity of a given part ordered
- Keep your personal bookmarks
- Tap into tech support database to determine the precise probe you need
- Review our product catalog
- Retrieve information from the industry's most complete Sourcebook of probe information
- Link to the most popular and newest web sites across the industry
- Get a drawing for your exact probe
- Order probes using competitor part numbers

Our Sales Support Staff.
Your First Point of Contact.

Our Inside Sales Staff from left to right: Chiquita Tribitt, Jill Lewis, Kim Murie, Tena Robinson, Wendy Welter, Terry Perkins, Kelly Robb, Christina Lopez and David Robinson

Our Accounting and Administrative Staff from left to right: (standing) Gary Wayne, Dana Wheatley, Shirley Cruitt, Robert Grissom, Barbara Longdon; (seated) Tanis Carey, Matt Dutcher, Marcia Lacey

Our Technical Support Staff.
Your Contacts for Probe Knowledge.

Our Technical Support Staff from left to right: (standing) Jon Diller, Kimberly Hause, Joe Bunch, Ken Sell, Peter Tran, Stan Wilson, Ron Meek; (seated) Tim Dowdle, Rick Westpfahl, Brian Prosser, Sharon Morrow and Jay Preister

Our Engineering Staff.
Earning Our Leadership Through Innovation.

Our Engineering Staff from left to right: (standing) Dwight Thelwell, Al Terhune; (seated behind table) David Sanders, Glen Weichold, Don Marx, Joyce Smith, Leroy Cox; (seated, front) Bill Thurston, Kiley Beard and Howard Weiner

Leadership. You'll Find It at Every Point in IDI.

Probe Selection

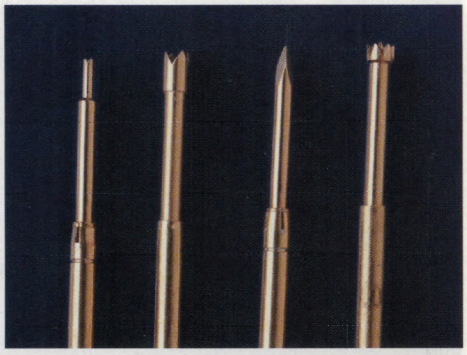
We're known in the industry as "the innovators in probe technology." While we were introducing new probe innovations over the past 21 years, we were building the widest product offering in the industry. Today, IDI is your leading resource for production testing of both bare and loaded PCB's, flex circuits, substrates, connectors, back planes, and other circuitry. If the right probe does not exist to meet your testing requirements, IDI engineers are renown for their custom design capabilities.

Research and Development

The source of innovation at IDI comes from a combination of our intense focus on customer satisfaction and our talented and motivated group of product designers. Over the last 20 years, IDI has been the home of one innovation after another: Exacta, Quad O, Rotator™, Coax Probe, to name a few...and the newest revolution in probe design, the ICT Series, featuring patent pending bifurcated probe technology that outperforms bias ball and all other spring contact probe designs across the board.

Tip Styles

You'll even find our leadership literally at the point of contact. We offer the widest selection of plunger tip styles.



IDI Quality. From People to Product, an Extreme Point of Pride.

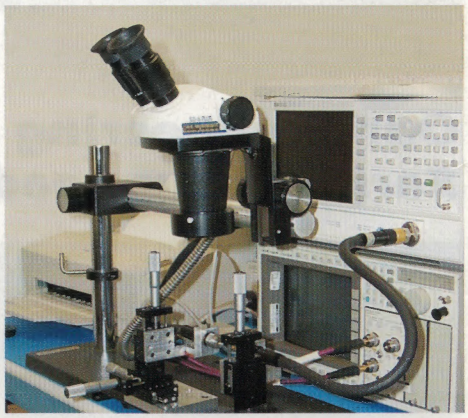
Each and every employee at IDI is dedicated to the same cause: producing the highest quality probes and receptacles at the most competitive price. No one in the industry today can surpass IDI in our enthusiasm for quality. It is part of a Total Quality Commitment made by the employees of IDI who team up to satisfy your needs.

We have set stringent guidelines for IDI quality, and each and every IDI employee and vendor adheres to them.

As an ISO 9001 registered company, we use the ANSI/ASQC Z 1.4 to establish appropriate sample quantities. Our calibration system is maintained in conformance with ISO-10012-1 and is traceable to the National Institute of Standards and Technology. All final acceptance tools, gauges, and instruments are inspected, cleaned and calibrated at regular intervals to assure maximum accuracy.

Every production operator undergoes thorough classroom training and extensive on-the-job training in Statistical Process Control. Every probe in this catalog is charted on $\bar{x}$ and R charts during manufacturing for overall length. In addition, the crimp is monitored via go/no-go gauges by each operator. We employ sophisticated production and test equipment which we often design, build and update ourselves in order to keep pace with this rapidly changing industry.

- Our Quality Control Lab is equipped with noncontact measuring equipment capable of 0.0001 of an inch accuracy and spring force measuring equipment accurate to within 0.001 of a gram.
- Plating thickness is verified using the nondestructive x-ray fluorescent principle capable of multiple thickness measurements.
- Base material hardness is confirmed on a micro-hardness tester with a knoop indenter.
- Computer-aided design is utilized to assist in optimizing the function of existing designs as well as new probe development.



Tighter tolerances and vendor conformance to specifications are key factors in producing our product. Because they serve as an extension of IDI, we require that each of our vendors adhere, in meticulous detail, to design specifications.

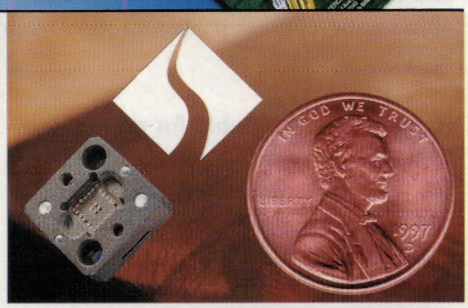
In addition to component and final assembly dimensional conformance, the Quality Assurance Department also performs and maintains records on functional testing. Life cycle testing is conducted on all standard and many nonstandard probes to establish life expectancy and resistance at a given current. The test results are stored on disk and used as benchmark data for future tests and designs. Once established, these standards are maintained using computerized processing which yields consistent, high quality results.

Platings

This is where we shine! Our customers tell us that our work in plating technologies has significantly increased probe performance. But every application has different plating needs so IDI offers plungers, barrels, springs and receptacles in more material and plating combinations than anyone else. Our exclusive G2 Barrel offers the lowest resistance in the industry.

Customer Support

Like our President, Ed Schifman says, "Every point of contact with a customer is a moment of truth for us." Wherever you have contact with IDI, whether it's one of over 200 Technical Sales Specialists, our award-winning web site, or our Catalog-Sourcebook, you'll find that we are driven to satisfy your need for information; the right probe, the desired delivery date, all at the optimum value.



IDI people. Setting the standards for probe quality.

Quality, after all, is the result of planning and execution by a committed group of talented people. At IDI, we are fortunate to have such a team of men and women who make sure our customers experience IDI quality every day, at every point of contact — from our Technical Sales Specialists in the field, to our inside sales specialists, to our engineers, and to the professionals who manufacture, package and ship your probes. Each of us believes that if we make sure you're getting the optimum value from your probe investment, we'll keep earning your business and in turn our leadership. If you work with us, you know many of these people. They become more than a name or a voice, but trusted business partners who get to know your needs and try to anticipate them. Who make sure we always have the probes you need, when you need them.

ISO9001. One way we prove our quality.

It's one thing to talk about quality control. It's another thing to prove it. Every company must have some sort of Quality Management System, otherwise, they wouldn't be in business. However, it is often informal, a concept rather than documented and enforceable. So even though a company talks about their dedication to quality control, it's often hard to know what is actually the case. That's why it was so important for us at IDI to pursue and achieve ISO 9001 accreditation.

Our ISO 9001 accreditation assures you that IDI has a documented, recognized quality management system — one that complies with globally recognized standards for products, processes and information technology. More importantly, our ISO 9001 accreditation is your assurance that we faithfully adhere to our quality management system.

Synergetix. Our sister company takes our experience in probe technology another step.

In 1994, IDI launched a company to take our leadership in probe technology into other business segments. The result: Synergetix is today a leader in the design and manufacture of custom interfaces, sockets and connectors. In the ATE industry, Synergetix has quickly gained a reputation for leadership in customized sockets, ATE test head interfaces and tester to handler interfaces. Design engineers are turning to Synergetix for multi-cycle interconnects in a variety of industries, including automotive, medical, military and telecommunications. At the heart of every Synergetix product is the probe technology of IDI, assuring the same unsurpassed performance our probe customers have come to rely on.

The IDI Probe.
Your Need is the Starting Point.

The question we ask our customer is not "what probe?" but rather, "what need?". At IDI, we want to make sure every customer selects the right probe to match their application and, with the industry's most extensive product offering, we are in the enviable position to succeed every time. We have probe designs that many customers don't know exist. And if you have an application that requires a new probe design, let's go to work. IDI's reputation as the custom probe specialist is well-founded. This responsiveness is part of the reason we have become the incubator for major advances in probe technology and offer the widest range of replaceable spring contact probes to meet your testing needs.

IDI probes are suitable for production testing of both bare and loaded PCBs, flex circuits, substrates, connectors, back planes and other circuitry where a number of points must be accessed.

Our ICT Series, introduced in 1998, has revolutionized probe design for in-circuit testing and is quickly replacing the problematic, out-dated bias designs.

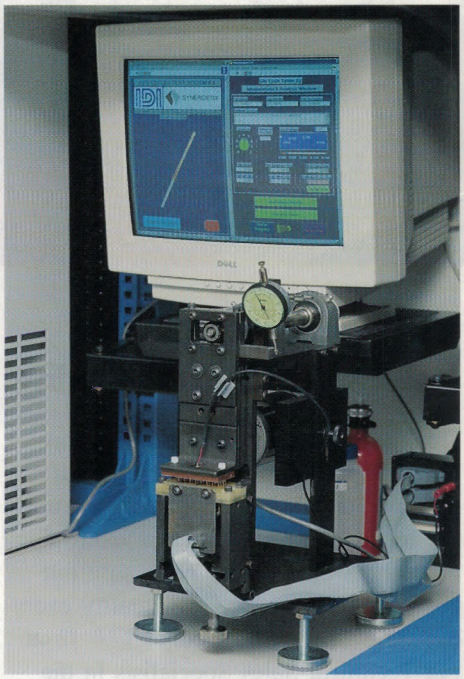
In addition, IDI is a recognized leader in the design of probes to solve the problems faced in surface mount, dual level, and off-grid fixturing.

IDI probes are available in 50 different series and will allow for testing on center spacing down to .010 inches. In addition to a wide range of series, a variety of plunger tip styles is also offered. These, in most cases, are available with either gold or Duralloy™ plating options. IDI spring contact probes and receptacles are interchangeable with other industry standard products.

Your Assurance of Quality

IDI probes are assembled on a variety of specialized equipment designed by IDI engineers. This ensures the production of uniform probes in every series offered. Each probe passes through extensive quality control tests to ensure IDI's reputation for high quality product is maintained. Some of the most critical quality control checks include: plating thickness, spring tension, barrel and plunger uniformity, and tolerances. All of our probes are designed and manufactured to perform at consistently low resistance levels over a large number of test applications. To enable IDI to constantly check the performance of our probes, we are now using the third generation design of the computerized life test system. This system allows IDI to test probes for millions of cycles. The data is stored and converted into a file for statistical analysis.

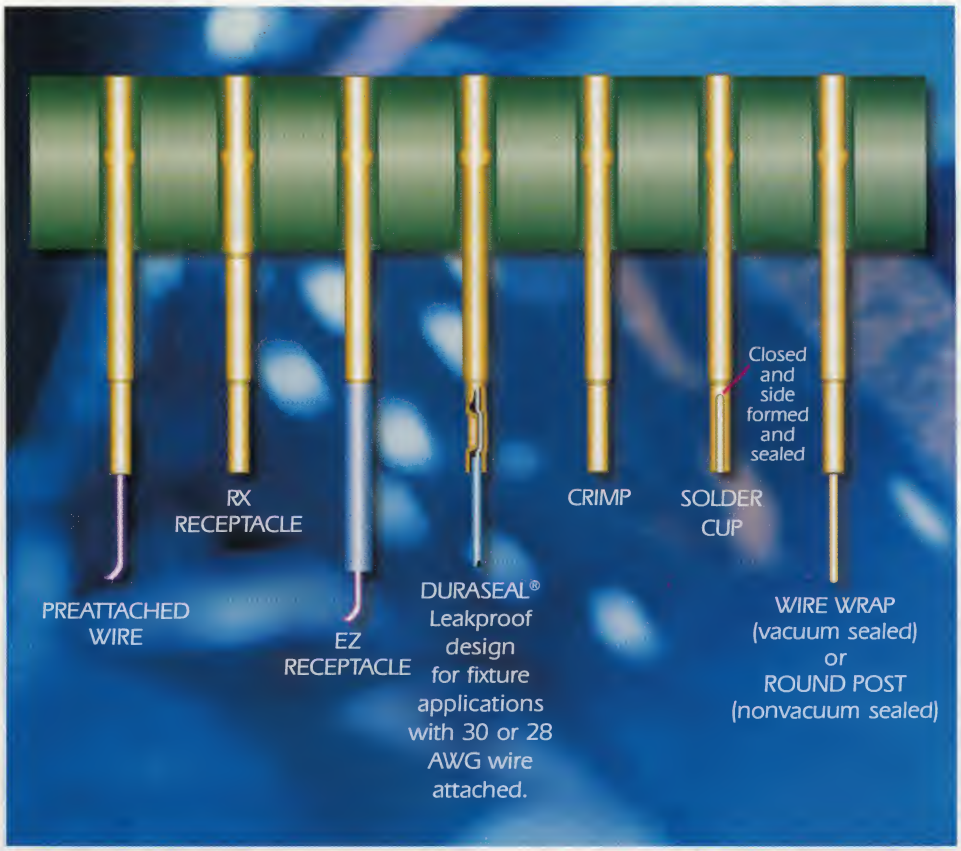
We believe that testing our probes this stringently makes IDI customers' buying decisions a little easier.



Life cycle testing

The IDI Receptacle. The Options Continue.

IDI receptacles are available with seven termination options: EZ wire plug, DuraSeal®, crimp, solder cup, wire wrap (square post), round post and preattached wire. All DuraSeal and Wire Wrap receptacles are leakproof, making them suitable for vacuum fixture applications.



Your Assurance of Quality

IDI receptacles pass extensive quality control examinations similar to our probes. This includes specialized tests to monitor key items such as uniform tubular diameter, press ring diameter, probe insertion force, wire or wire wrap pin extraction force, straightness and leakage. Because our receptacles receive so much attention during production, we know they will be well received by IDI customers.

Receptacle testing for insertion and extraction force.

Patented DuraSeal®

DuraSeal is available only from IDI, the industry leader. The DuraSeal is a patented cold weld connection that forms a gas-tight/vacuum seal. The pullout force of the connection exceeds the full tensile strength of the attached wire.

The RX Option

The standard press ring, or the special press ring/alignment bulge on the RX receptacle, allows for easy installation in the probe plate material. The receptacle remains fixed, eliminating wire flexing or potential conductor failures. The dimples on each receptacle hold the probe in place during testing and allows the probe to be inserted and removed with ease.

Tip Applications
IDI Points the Way

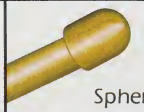
IDI is a recognized leader in the development of tip styles to meet the stringent demands of customers throughout the world. It is very important that the proper plunger tip is utilized to ensure optimum contact reliability. The information below can help serve as a guideline in the selection of the proper plunger tip for your application. If you need further information, please feel free to contact a Product Specialist for further assistance.

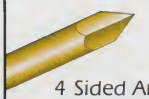
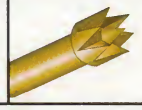
Environmental Applications

Spring Material	Maximum Service Temperature (1Hr.)	24 Hour Temperature
Music Wire	250°F (120°C)	185°F (85°C)
Beryllium Copper	400°F (205°C)	248°F (120°C)
Stainless Steel	500°F (260°C)	356°F (180°C)

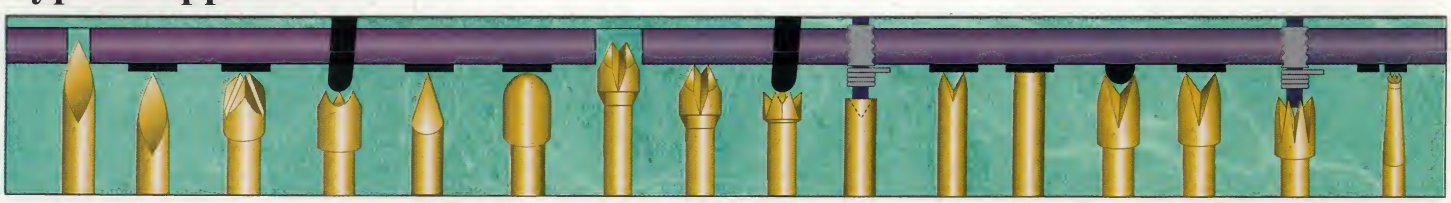
Due to lubrication factors, please inform factory if service temperatures will be higher than 250°F (120°C) or lower than -76°F (-60°C).

Selection Guide

Plunger	Tip Style	Application
A or G	 Concave	Long Leads, Terminals and Wire Wrap Posts
B	 Spear Point	Lands, Pads or Plated through Holes
C or F	 Flat	Gold Edge Fingers— No indentations or marks
D or J	 Spherical Radius	Gold Edge Fingers— No indentations or marks
E	 Convex	Lands, Pads or Plated through Holes
FX	 Flex Tip	Contaminated Boards, Conformal Coatings, or OSP
H or HS	 Serrated	Lands, Pads, Leads or Terminals
HT	 Tapered Serrated	Small Pads or Lands
K, S or T	 Chisel	Lands, Pads or Plated through Holes— Self-Cleaning
LM	 Star	Plated through Holes, Lands or Pads— Self-Cleaning

Plunger	Tip Style	Application
NT	 Needle Teeth	Lands, Pads, Contaminated Boards— Self-Cleaning
SN	 Single Needle	Contaminated Boards, Conformal Coatings, or OSP
SP or SPB	 Chiseled Spear	Lands, Pads or Vias— Contaminated Boards, OSP, Self-Cleaning
SW	 4 Sided Arrow Head	Lands, Pads or Vias, Contaminated Boards, OSP, Self-Cleaning
TX	 3-Point Chiseled Crown	Lands, Pads or Vias, Contaminated Boards, Self-Cleaning
U or Z	 4-Point Crown	Lands, Pads, Leads or Wire Wrap Posts— Self-Cleaning
UT or UST	 Tapered Crown	Small Pads or Lands, Contaminated Boards
V or W	 4-Point Crown	Lands, Pads, Leads or Wire Wrap Posts— Self-Cleaning
X	 Tapered Crown	Lands, Pads, Leads or Plated through Holes— Self-Cleaning
Y	 Tulip	Lands, Pads, Leads or Wire Wrap Posts— Self-Cleaning

Typical Applications



Plunger Tip Styles by Size

Most tip styles are not available in every size—each is best suited to specific testing environments and size ranges. The following chart provides a quick reference of sizes in which each tip style is offered.

Series / Centers	Penta 0 .010 (0,25)	Quad 00 .020 (0,51)	Quad 0 Tri 0 .020 (0,51) .025 (0,64)	SS30 .039 (0,99)	S-00 DS .039 (0,99)	S-00/SS40 .039 (0,99)	S-0/SS50 .050 (1,27)	SC-0 .050 (1,27)	SC-0 RT .050 (1,27)	SJ-0 RT .050 (1,27)	SJ-0 .050 (1,27)	S-1/SS75 .075 (1,91)	SL-1 .075 (1,91)	SL-1 RT .075 (1,91)	SS-100/GSS-100 .100 (2,54)	S-2 .100 (2,54)	S-25 .100 (2,54)	S-25 RT .100 (2,54)	SR-25 .100 (2,54)	S-3 .125 (3,18)	S-4 .156 (3,96)	S-5 .187 (4,75)	ICT-100 .100 (2,54)	ICT-075 .075 (1,91)	ICT-50J .050 (1,27)	ICT-50C .050 (1,27)
BECU PLUNGERS																											
A							◆	◆			◆	◆	◆		◆	◆	◆		◆	◆	◆	◆			◆	◆
B	◆	◆	◆	◆	◆	◆	◆					◆	◆		◆	◆	◆		◆	◆	◆	◆				
C	◆	◆	◆	◆	◆	◆	◆					◆				◆	◆			◆	◆					
D							◆					◆			◆	◆	◆				◆					
E							◆					◆	◆			◆	◆			◆	◆					
F												◆				◆	◆			◆	◆	◆				
G				◆	◆	◆	◆					◆	◆			◆	◆			◆	◆					
H							◆					◆	◆		◆	◆	◆		◆	◆	◆	◆	◆	◆		
HL																	◆					◆				
HS													◆		◆											
HT																	◆									
J			◆	◆	◆	◆	◆	◆			◆	◆	◆		◆	◆	◆			◆	◆					◆	◆
K												◆				◆	◆			◆	◆					
LM														◆			◆	◆								
NT																	◆									
S													◆				◆						◆			
T							◆		◆	◆			◆		◆	◆	◆	◆	◆				◆	◆		
TX													◆				◆						◆	◆		
U				◆	◆	◆	◆					◆	◆											◆		
UT				◆			◆										◆									
V							◆						◆			◆	◆									
W																	◆									
X													◆			◆	◆									
Y													◆				◆		◆							
STEEL PLUNGERS																										
B								◆			◆		◆				◆								◆	◆
FX													◆				◆									
H																	◆									
HS								◆			◆														◆	◆
NT																	◆							◆	◆	
SN																	◆									
SP/SPB								◆			◆		◆				◆							◆	◆	◆	◆
SW								◆			◆		◆				◆							◆	◆	◆	◆
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TL								◆			◆															◆	◆
TS													◆														
U																	◆							◆			
UST/UR								◆			◆		◆				◆							◆	◆	◆	◆
VT													◆												◆		
W																	◆									
WO																	◆							◆			
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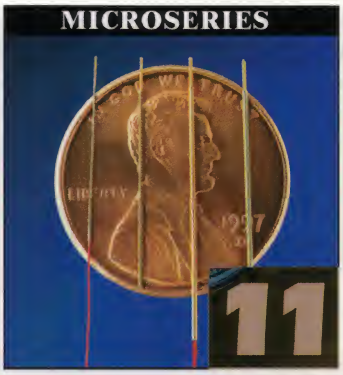
Z								◆			◆															◆	◆



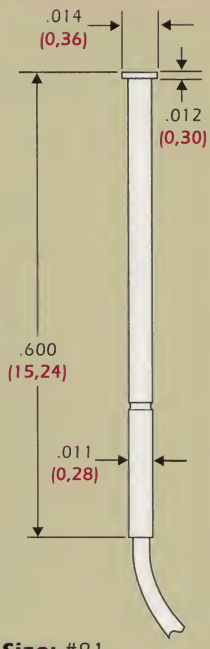
Max. Travel	Recommended Minimum Centers						
	.039 (0,99)	.050 (1,27)	.075 (1,91)	.100 (2,54)	.125 (3,18)	.156 (3,96)	.187 (4,75)
.050 (1,27)	SS40 pg.17	SS50 pg.20	SS75 pg.27	SS & GSS pg.30	•	•	•
.090 (2,29)	Size 00 pg.16	•	•	•	•	•	•
.100 (2,54)	SS30 pg.14	Size 0 pg.18	Size 1 pg.26	•	•	•	•
.160 (4,06)	•	•	SL1 pg.28	Size 2 pg.32	•	•	•
.250 (6,35)	•	SJ0** pg.22	SL1 pg.28	Size 25 pg.34	Size 3 pg.38	Size 4 pg. 39	Size 5 pg. 40
.400 (10,16)	•	•	•	SR25 pg.36	•	•	•

** Also, SCO (pg.24) • Consult Factory

RECEPTACLE PENTA 0

Connections: Preattached wire
Material: Nickel/silver, gold-lined inside

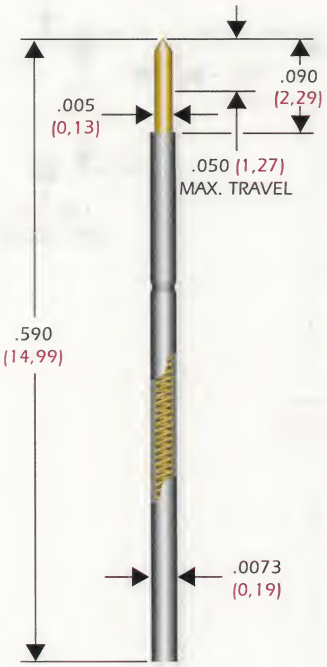
PENTA 0REC



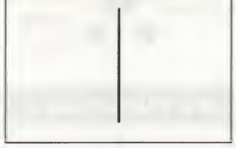
Drill Size: #81
Mounting Hole Size: .013 (0,33)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

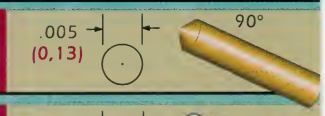
See pages 92-93 for recommended fixturing.



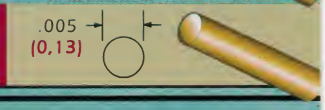
ACTUAL SIZE



PENTA 0B



PENTA 0C



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—
.010 (0,25) without receptacle
.015 (0,38) with receptacle
Current Rating—.200 amps continuous
Spring Force—0.7 oz. (20g) @ .033 (0,84) travel
Contact Resistance—Less than 250 milliohms
Recommended Working Travel—.033 (0,84)

MATERIALS

Contact Barrel—Duragold®
Spring—Music wire, gold plated
Plunger—Steel, gold plated
Recommended Wire—36 gage wire preattached to probe, 33 gage wire preattached to receptacle.

HOW TO ORDER

PENTA 0B	36	1
PROBE **0B**—Spear Point **0C**—Flat Tip	**WIRE LENGTH** (IN INCHES)	**STRIP LENGTH** (IN INCHES)

For information about size PENTA 0 Spring Contact Probes and their installation in matrix for testing, please contact IDI.

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

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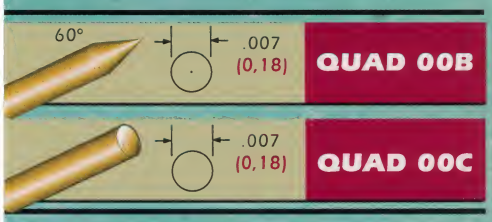
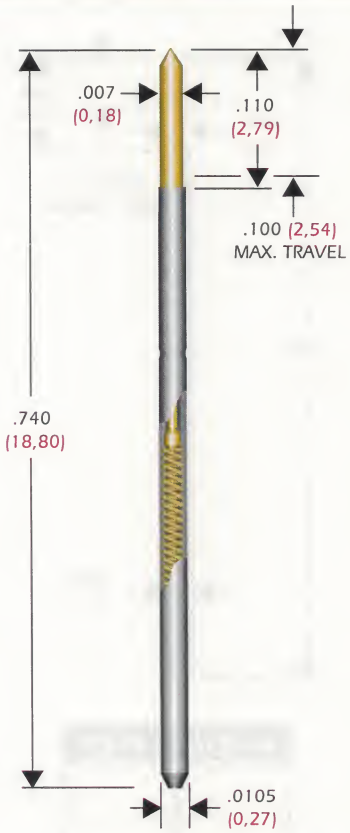
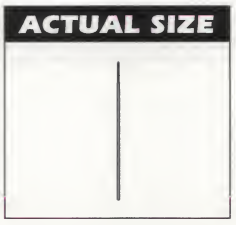
QUAD 00

.020 CENTERS





ACTUAL SIZE

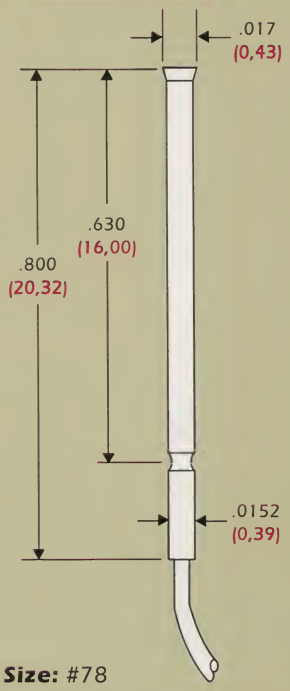


RECEPTACLE QUAD 00

Connections: Preattached Wire, 30 GA

Material: Nickel/silver, gold-lined inside

QUAD 00REC



Drill Size: #78

Mounting Hole Size: .016 (0,41)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

See pages 92-93 for recommended fixturing.

HOW TO ORDER

QUAD 00B

PROBE
00B—Spear Point
00C—Flat Tip

For information about size QUAD 00 Spring Contact Probes and their installation in matrix for testing, please contact IDI.

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.020 (0,51)
Current Rating—.300 amps continuous
Spring Force—0.75 oz. (21g) @ .067 (1,70) travel
Preload Force—.23 oz. (6.5g)
Contact Resistance—Less than 160 milliohms
Recommended Working Travel—.067 (1,70)

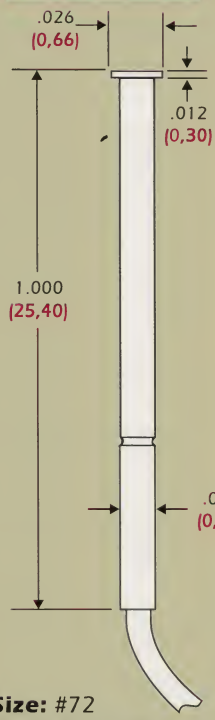
MATERIALS

Contact Barrel—Nickel/silver, gold lined inside
Spring—Music wire, gold plated
Plunger—Hardened steel, gold plated over nickel

RECEPTACLE QUAD 0 & TRI 0

Connections: Preattached wire, 26 GA
Material: Nickel/silver, gold plated

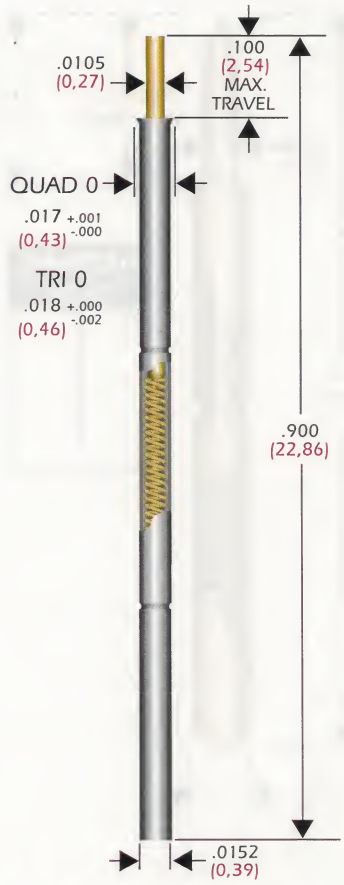
QUAD 0REC TRI 0REC



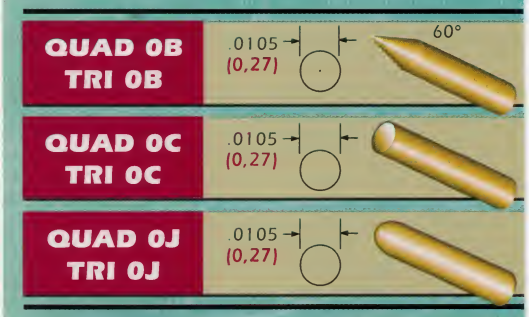
Drill Size: #72
Mounting Hole Size: .024/.025
(0,61/0,64)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

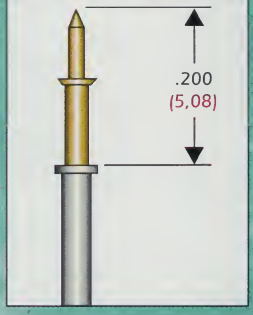
See pages 92-93 for recommended fixturing.



ACTUAL SIZE
QUAD 0 & TRI 0



Probe Installed in Receptacle



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—
QUAD 0: .020 (0,51) without receptacle
TRI 0: .025 (0,64) without receptacle
With Receptacle: .030 (0,76)
Current Rating—.500 amps continuous
Spring Force—0.7 oz. (20g) @ .045 (1,14) travel
Preload Force—0.41 oz. (11g)
Contact Resistance—
QUAD 0: Less than 60 milliohms
TRI 0: Less than 70 milliohms
Recommended Working Travel—.045 (1,14)

MATERIALS

Contact Barrel—
QUAD 0: Solid gold alloy
TRI 0: Nickel/silver, gold lined
Spring—Music wire, gold plated
Plunger—Hardened steel, gold plated over nickel
Recommended Wire—30 AWG wire preattached to probe, 26 AWG wire preattached to receptacle

HOW TO ORDER

QUAD 0B	36	1
PROBE & TIP **0B**—Spear Point **0C**—Flat Tip **0J**—Radius	**WIRE LENGTH** (IN INCHES)	**STRIP LENGTH** (IN INCHES)

For information about size QUAD 0 and TRI 0 Spring Contact Probes and their installation in matrix for testing, please contact IDI.

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

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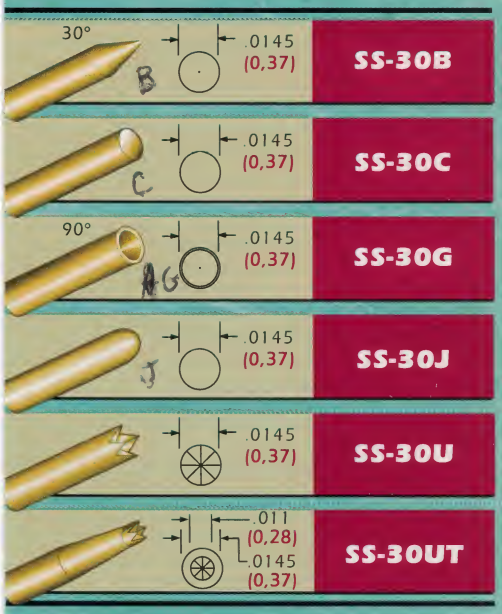
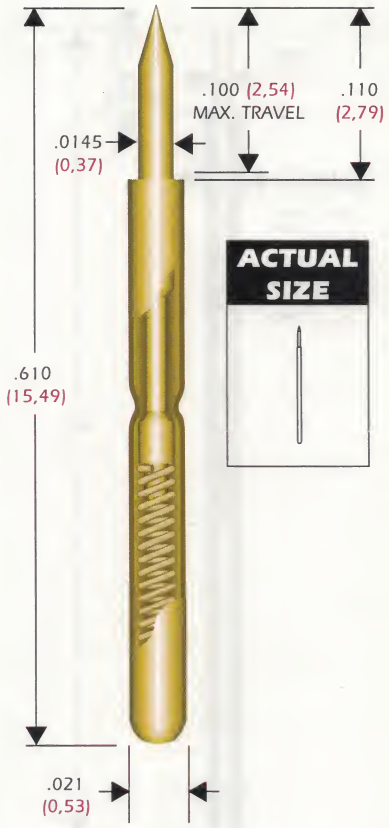




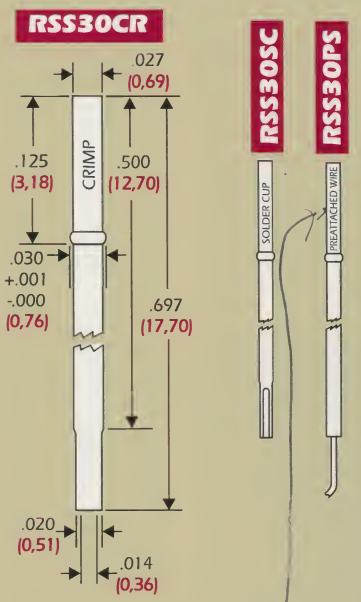
SPRING FORCE @ .067 (1,70) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
1.3 (37)	0.5 (14)	Stainless Steel
1.6 (45)	0.5 (14)	Music Wire

2/3 Travel

Additional forces and materials available, consult factory.

RECEPTACLE SIZE SS-30

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style PS: Preattached Wire, 30 GA vacuum sealed
Material: Nickel/silver, gold plated



Drill Size: 0,75 mm
Mounting Hole Size: .028/.0295 (0,71/0,75)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

Comes with 36" length wire

HOW TO ORDER

SS	30	B	1.3	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

1.3—1.3 oz. @ .067 (1,70) travel
1.6—1.6 oz. @ .067 (1,70) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

don't get this — really easy crimp tool will work

CRIMPING PLIERS—CPSS30
INSERTION TOOL—RTSS30

will have to get #35

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

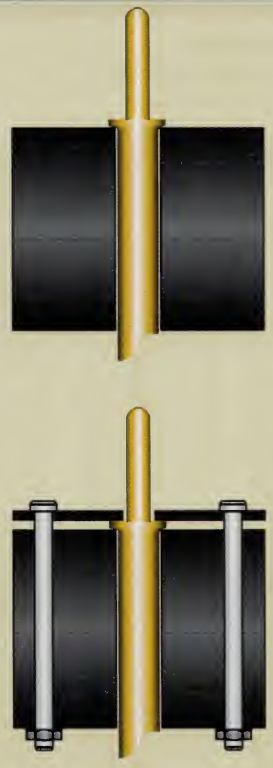
PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.039 (0,99)
Staggered Centers—.030 (0,76)
Current Rating—3 amps continuous
Spring Force—1.3 or 1.6 oz. @ .067 (1,70) travel
Contact Resistance—Less than 40 milliohms
Recommended Working Travel—.067 (1,70)

MATERIALS

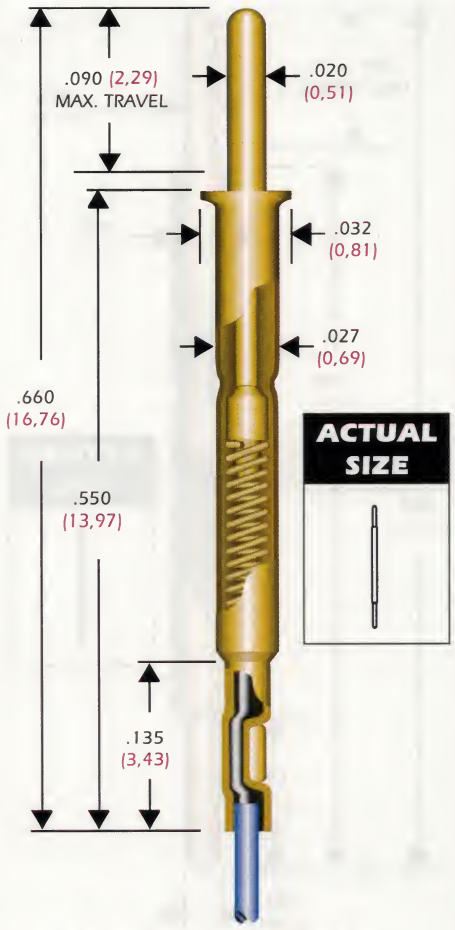
Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

MOUNTING OPTIONS



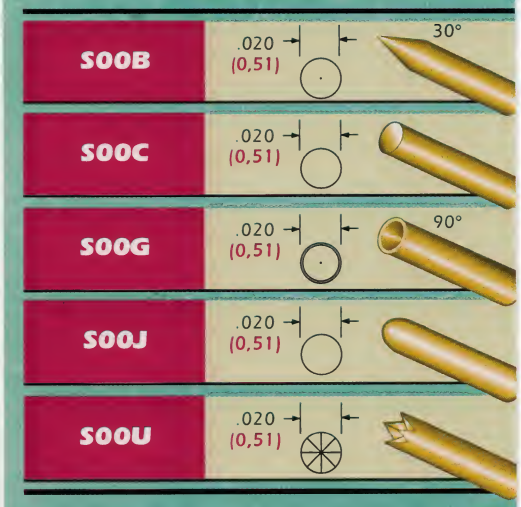
Drill Size: 0,75 mm
Mounting Hole Size: .028/.0295 (0,71/0,75)

Specifications subject to change without notice.
Dimensions in inches (millimeters)



SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
1.3 (37)	0.6 (17)	BeCu
1.6 (45)	0.7 (20)	Stainless Steel

Additional forces and materials available, consult factory.



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.039 (0,99)
Staggered Centers—.025 (0,64)
Current Rating—3 amps continuous
Spring Force—1.3 or 1.6 oz. @ .050 (1,27) travel
Contact Resistance—Less than 30 milliohms
Recommended Working Travel—.050 (1,27)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Beryllium copper or stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™
Wire—30 gage Kynar

HOW TO ORDER

S	00	J	1.3	G	DS
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	DURASEAL™ OPTION
			1.3—1.3 oz. @ .050 (1,27) travel **1.6**—1.6 oz. @ .050 (1,27) travel	**G**—Gold Plated Plunger **D**—Duralloy™ Plated Plunger	36", 30 GA blue Kynar unless otherwise specified

View updates of this information at http://www.idinet.com

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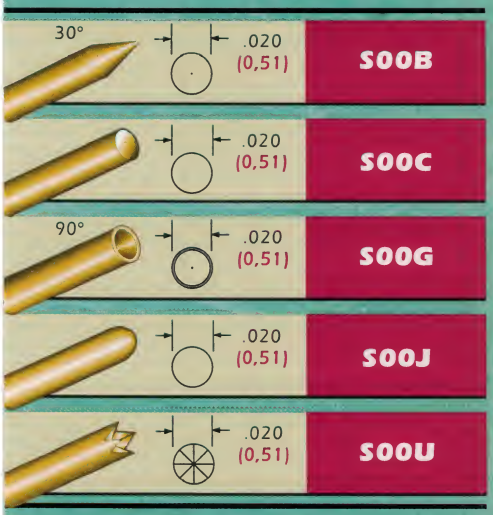
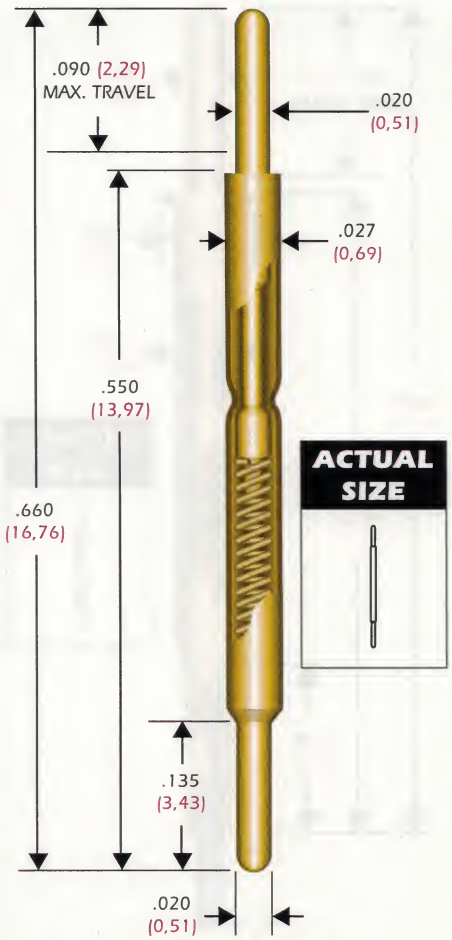


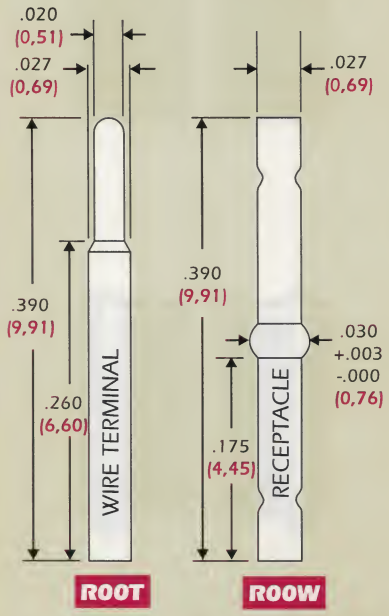


SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
1.3 (37)	0.6 (17)	BeCu
1.6 (45)	0.7 (20)	Stainless Steel

Additional forces and materials available, consult factory.

RECEPTACLE SIZE 00

Connections:
Style T: Wire Terminal
Style W: Receptacle
Recommended Wire: 30 GA
Material: Nickel/silver, gold plated



Drill Size: 0,75 mm
Mounting Hole Size: .028/.0295 (0,71/0,75)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

For fixturing information, see page 89 of the Source Book.

HOW TO ORDER

S	00	J	1.3	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

1.3—1.3 oz. @ .050 (1,27) travel
1.6—1.6 oz. @ .050 (1,27) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

CRIMPING PLIERS—
CP00T, STRIP LENGTH 3/8 (9mm)
CP00W, STRIP LENGTH 1/8 (3mm)
INSERTION TOOL—RT00

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.039 (0,99)
Current Rating—3 amps continuous
Spring Force—1.3 or 1.6 oz. @ .050 (1,27) travel
Contact Resistance—Less than 55 milliohms
Recommended Working Travel—.050 (1,27)

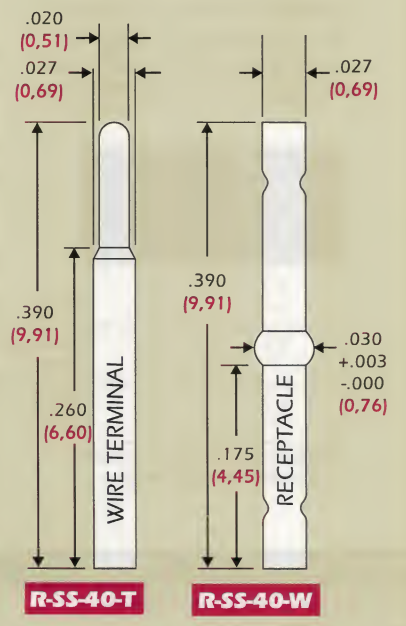
MATERIALS

Contact Barrel—Nickel/silver, preplated gold
Spring—Beryllium copper or stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

RECEPTACLE SIZE SS40

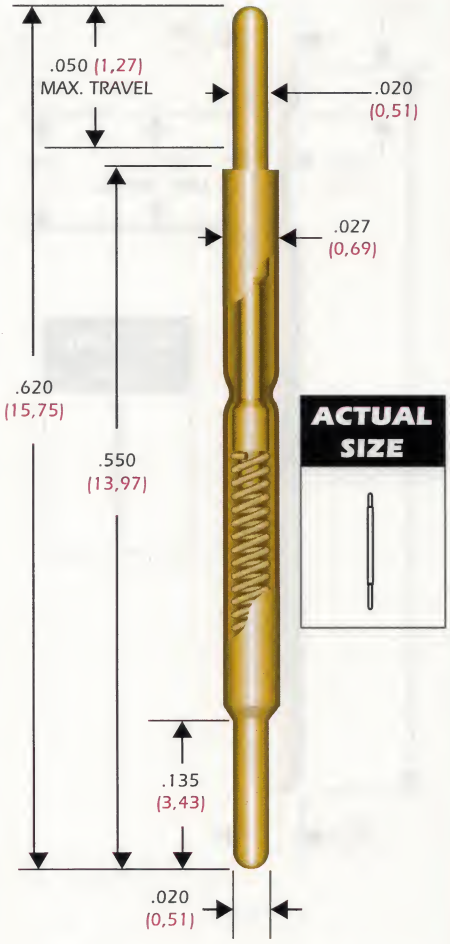
Connections:
Style T: Wire Terminal
Style W: Receptacle
Recommended Wire: 30 GA
Material: Nickel/silver, gold plated



Drill Size: 0,75 mm
Mounting Hole Size: .028/.0295
(0,71/0,75)

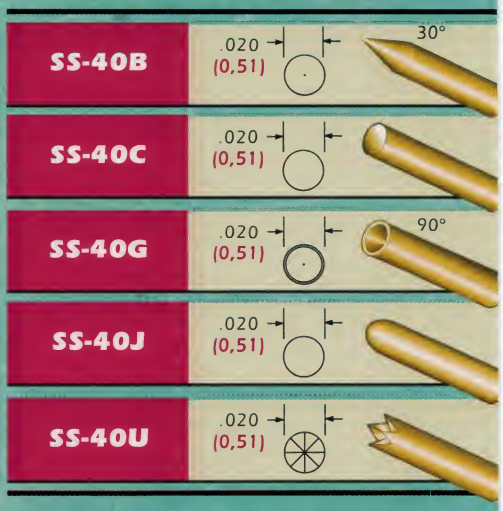
Specifications subject to change without notice.
Dimensions in inches (millimeters)

For fixturing information, see page 89 of the Source Book.



SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
1.8 (51)	1.1 (31)	BeCu
2.4 (68)	1.5 (43)	Stainless Steel

Additional forces and materials available, consult factory.



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.039 (0,99)
Current Rating—3 amps continuous
Spring Force—1.8 or 2.4 oz. @ .050 (1,27) travel
Contact Resistance—Less than 55 milliohms
Recommended Working Travel—.050 (1,27)

MATERIALS

Contact Barrel—Nickel/silver, preplated gold
Spring—Beryllium copper or stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SS	40	J	1.8	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

1.8—1.8 oz. @ .050 (1,27) travel
2.4—2.4 oz. @ .050 (1.27) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

CRIMPING PLIERS—
CPSS40T, STRIP LENGTH 3/8 (9mm)
CPSS40W, STRIP LENGTH 1/8 (3mm)
INSERTION TOOL—RTSS40

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

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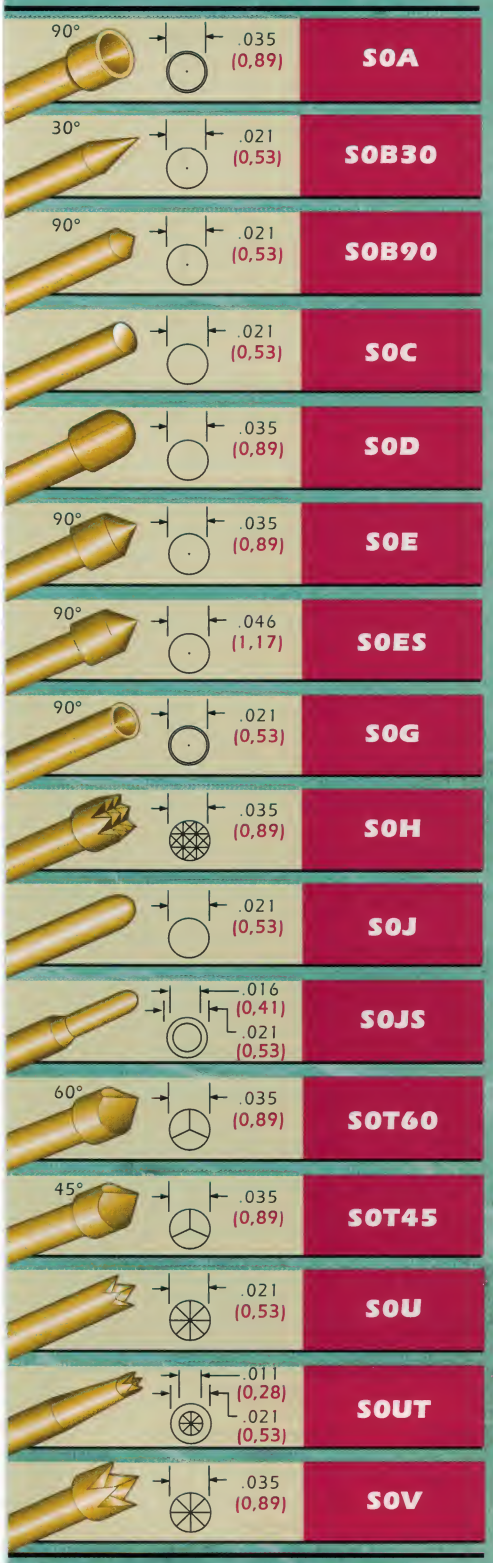
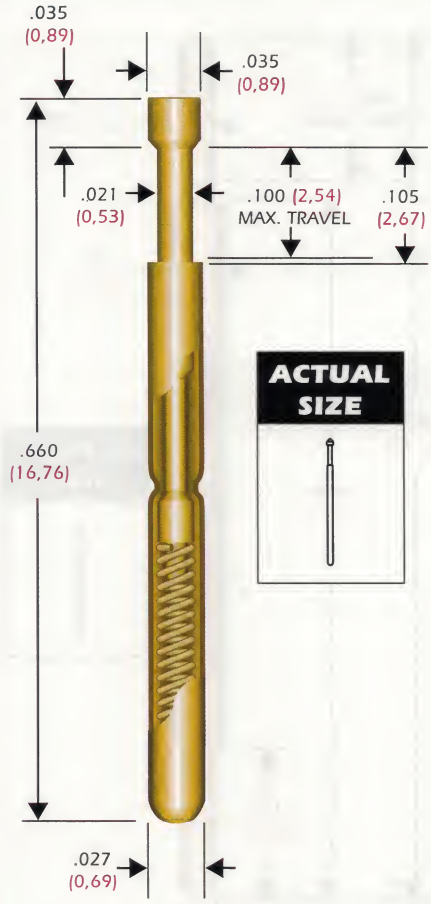
SERIES S

SIZE 0

.050 CENTERS





Improves pointing accuracy by a minimum of 50% and protects the inner portion of the probe from contaminants.

SPRING FORCE @ .070 (1,78) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
2.2 (62)	0.6 (17)	BeCu
2.5 (71)	0.6 (17)	Stainless Steel
3.7 (105)	1.9 (54)	Music Wire

Additional forces and materials available, consult factory.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—2.2, 2.5 or 3.7 oz. @ .070 (1,78) travel
Contact Resistance—Less than 35 milliohms
Recommended Working Travel—.070 (1,78)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Beryllium copper, stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

S	0	A	2.2	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

S—Standard
SX—Improved Pointing Accuracy

2.2—2.2 oz. @ .070 (1,78) travel
2.5—2.5 oz. @ .070 (1,78) travel
3.7—3.7 oz. @ .070 (1,78) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

View updates of this information at http://www.idinet.com

CRIMPING PLIERS—CP0
INSERTION TOOL—RT0

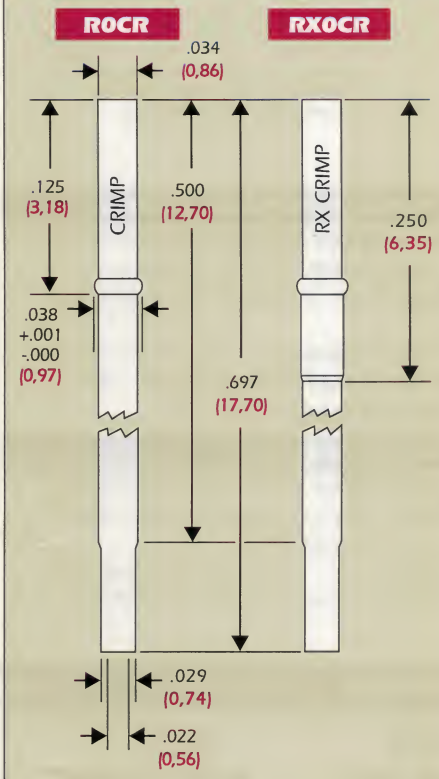
RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

RECEPTACLE SIZE 0

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style PW: Preattached wire, 30 GA non vacuum sealed
Style DS: DuraSeal, 30 or 28 GA wire attached, vacuum sealed
Style EZ: Wire plug, 30 GA
Recommended Wire: 28-30 GA
Material: Nickel/silver, gold plated, gold plated post

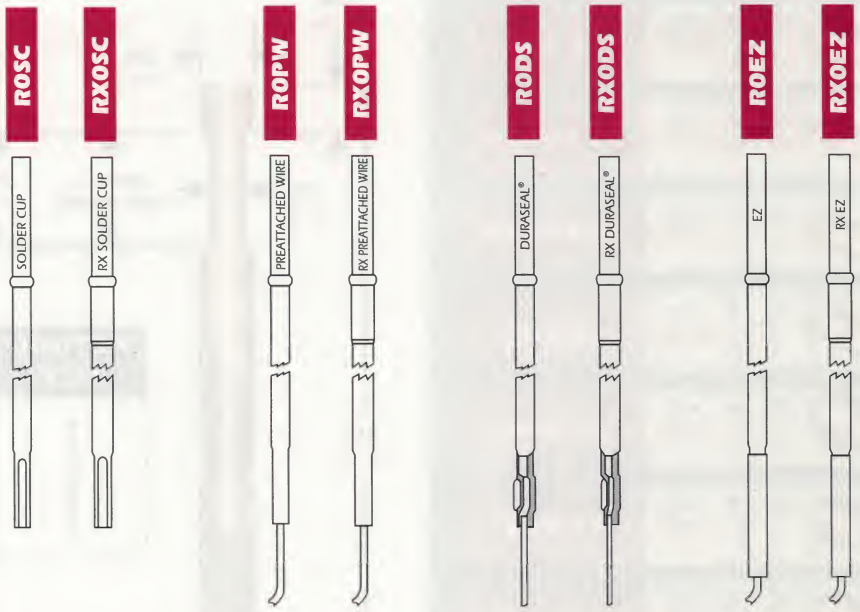
Series R, Standard
Series RX, Improved Pointing Accuracy

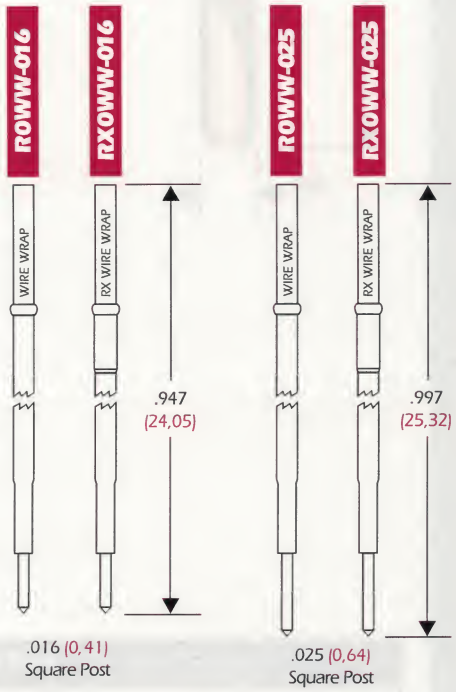


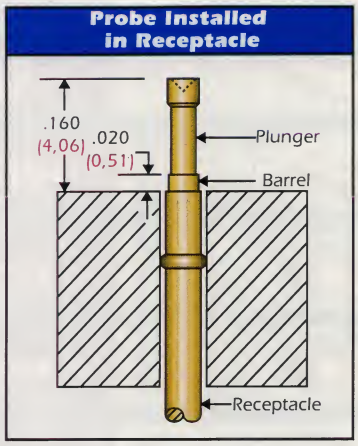
Drill Size: #64
Mounting Hole Size: .035/.0365 (0,89/0,93)

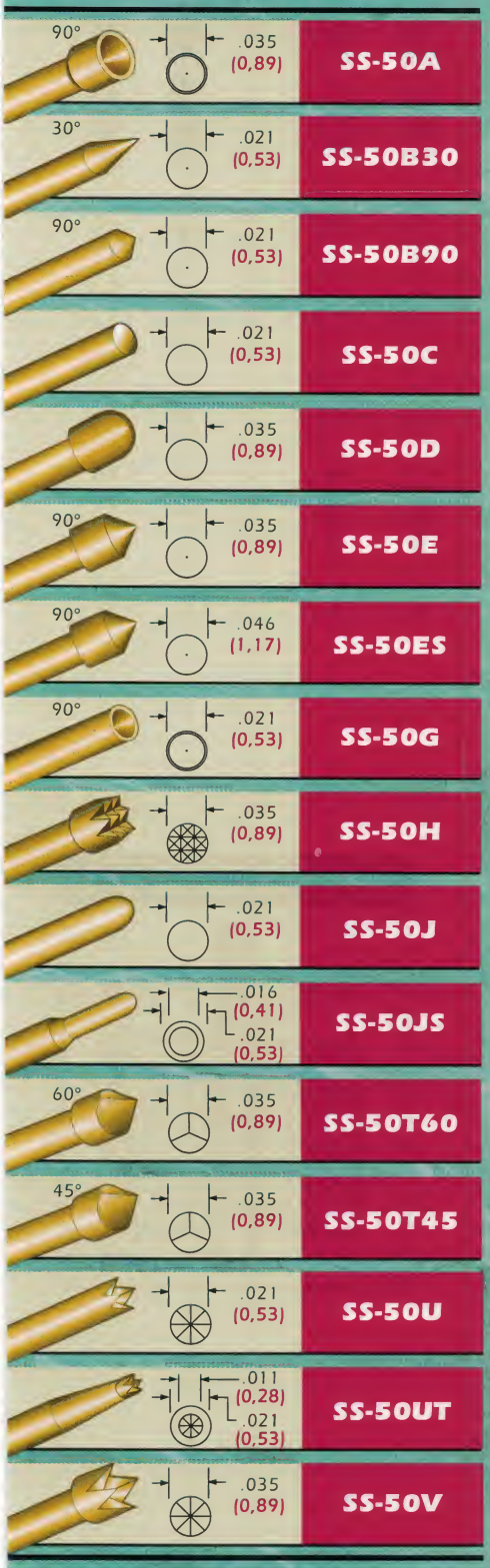
Specifications subject to change without notice.
Dimensions in inches (millimeters)

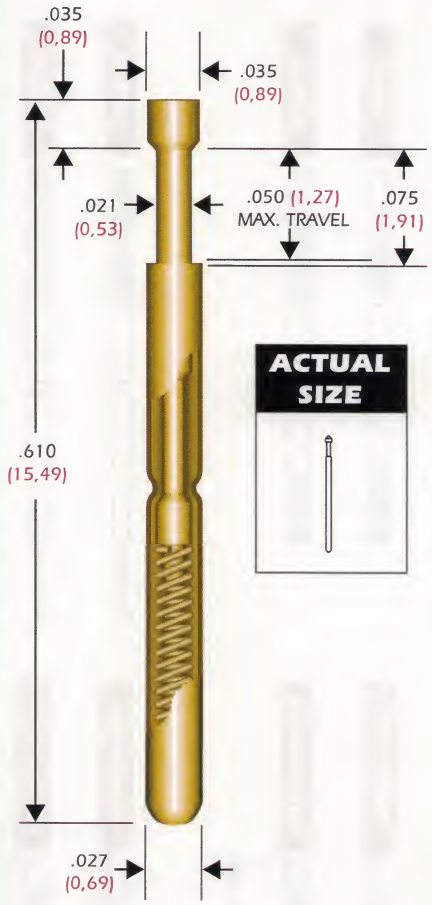
For fixturing information, see page 88 of the Source Book.











Improves pointing accuracy by a minimum of 50% and protects the inner portion of the probe from contaminants.

SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
2.9 (82)	1.7 (48)	BeCu
3.3 (94)	2.0 (57)	Stainless Steel
5.1 (145)	2.8 (80)	Music Wire

Additional forces and materials available, consult factory.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—2.9, 3.3 or 5.1 oz. @ .050 (1,27) travel
Contact Resistance—Less than 25 milliohms
Recommended Working Travel—.050 (1,27)
Maximum Travel—.050 (1,27)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Beryllium copper, stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SS	50	A	2.9	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

SS—Standard
SSX—Improved Pointing Accuracy

2.9—2.9 oz. @ .050 (1,27) travel
3.3—3.3 oz. @ .050 (1,27) travel
5.1—5.1 oz. @ .050 (1,27) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

CRIMPING PLIERS—CPSS50
INSERTION TOOL—RTSS50

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

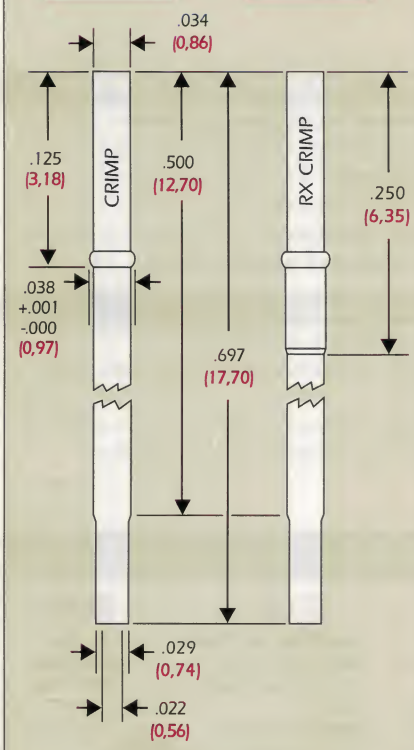
FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

RECEPTACLE SIZE SS-50

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style PW: Preattached wire, 30 GA non vacuum sealed
Style DS: DuraSeal, 30 or 28 GA wire attached, vacuum sealed
Style EZ: Wire plug, 30 GA
Recommended Wire: 28-30 GA
Material: Nickel/silver, gold plated, gold plated post

Series R, Standard
Series RX, Improved Pointing Accuracy

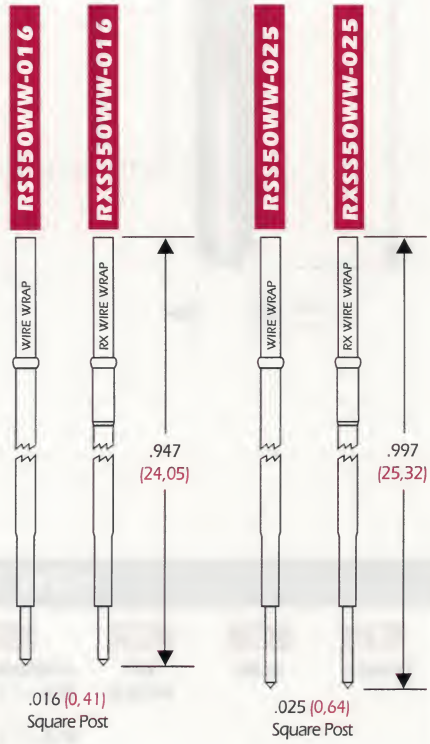
RSS50CR **RXSS50CR**

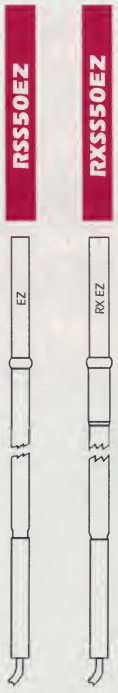


Drill Size: #64
Mounting Hole Size: .035/.0365 (0,89/0,93)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

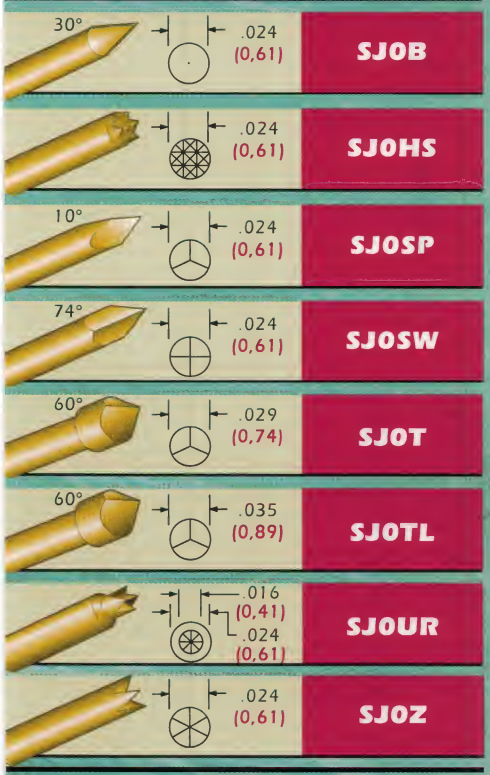
For fixturing information, see page 88 of the Source Book.

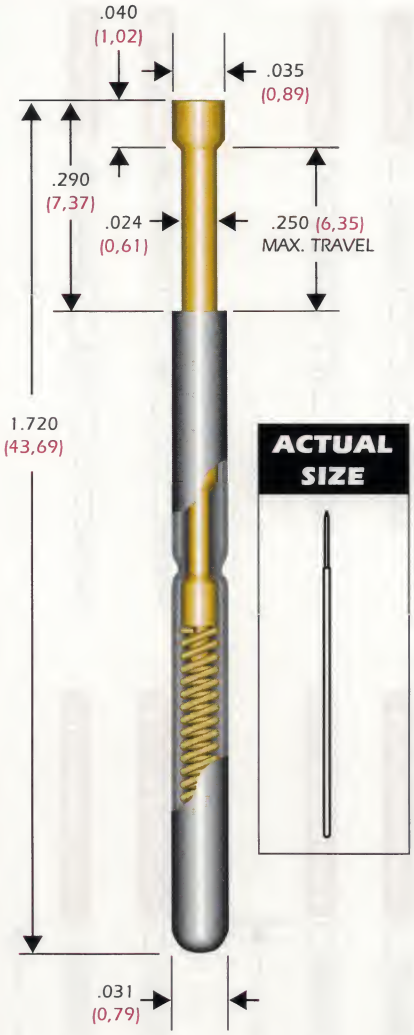




BECU PLUNGERS

STEEL PLUNGERS





ACTUAL SIZE

FLUXBUSTERS™ FOR NO-CLEAN TESTING

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
3.7 (105)	2.1 (59)	Stainless Steel
5.5 (156)	3.0 (85)	Music Wire
7.0 (199)	2.6 (74)	Music Wire
10.0 (284)	2.8 (80)	Music Wire

Additional forces and materials available, consult factory.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—3.7, 5.5, 7.0 or 10.0 oz. @ .170 (4,32) travel
Contact Resistance—Less then 17 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—DuraGold®
Spring—Stainless steel or music wire, gold plated
Plunger—Beryllium copper or steel, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SJ	0	A	7	DG	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTION
			3.7—3.7 oz. @ .170 (4,32) travel **5.5**—5.5 oz. @ .170 (4,32) travel **7.0**—7.0 oz. @ .170 (4,32) travel **10.0**—10.0 oz. @ .170 (4,32) travel	**DG**—Gold Plated Plunger, DuraGold® Barrel **DGD**—Duralloy™ Plated Plunger, DuraGold® Barrel	

CRIMPING PLIERS—CPRJ0
INSERTION TOOL—RTRJ0

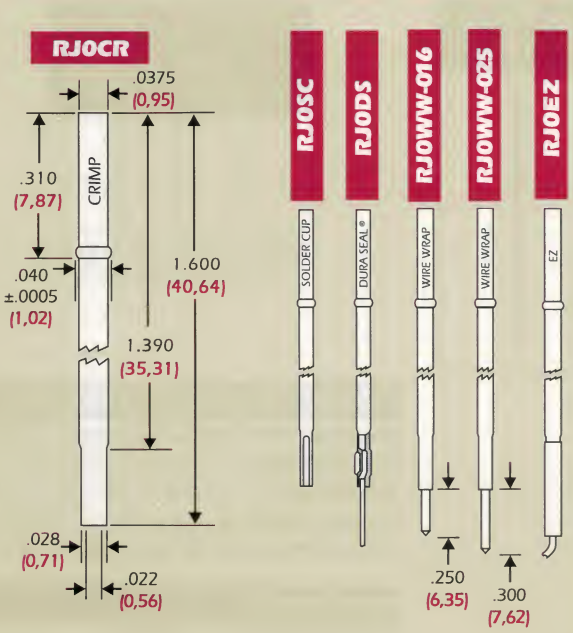
RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

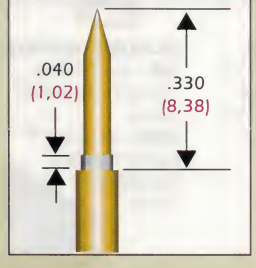
RECEPTACLE SIZE RJ0

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style DS: DuraSeal, vacuum sealed
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style EZ: Wire plug, 30 GA
Recommended Wire: 28-30 GA
Material: Beryllium copper, gold plated



Drill Size: #61
Mounting Hole Size: .0385/.0390
(0,98/0,99)

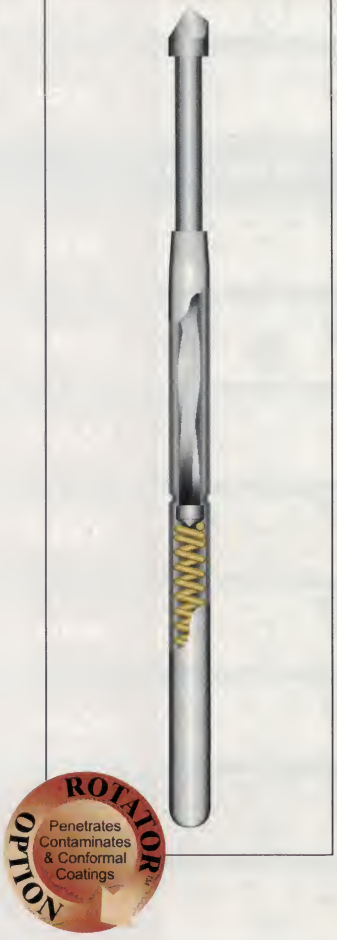
Probe Extension from Receptacle



Specifications subject to change without notice.
Dimensions in inches (millimeters)

ICT OPTION PAGE 46

ROTATOR OPTION PAGE 52



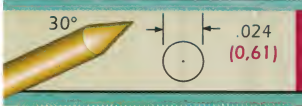
SERIES SC — SIZE 0 — .050 CENTERS

BECU PLUNGERS

SC0A

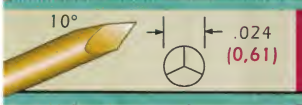
SC0J

STEEL PLUNGERS

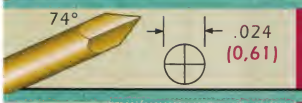


SC0B

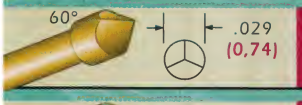
SC0HS



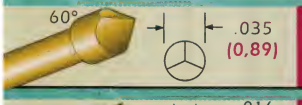
SC0SP



SC0SW



SC0T



SC0TL

SC0UR

SC0Z

* Travel limited to .232 (5,89) max with headed probe.

ACTUAL SIZE

FLUXBUSTERS® FOR NO-CLEAN TESTING

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.2 (91)	2.0 (57)
5.4 (153)	2.0 (57)

Additional forces and materials available, consult factory.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—3.2 or 5.4 oz. @ .170 (4,32) travel
Contact Resistance—Less than 17 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—DuraGold®
Spring—Music wire, gold plated
Plunger—Beryllium copper or steel, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SC	0	A	3.2	DG	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTION

3.2—3.2 oz. @ .170 (4,32) travel
5.4—5.4 oz. @ .170 (4,32) travel

DG—Gold Plated Plunger, DuraGold® Barrel
DGD—Duralloy™ Plated Plunger, DuraGold® Barrel

CRIMPING PLIERS—CPRC0
INSERTION TOOL—RTRC0

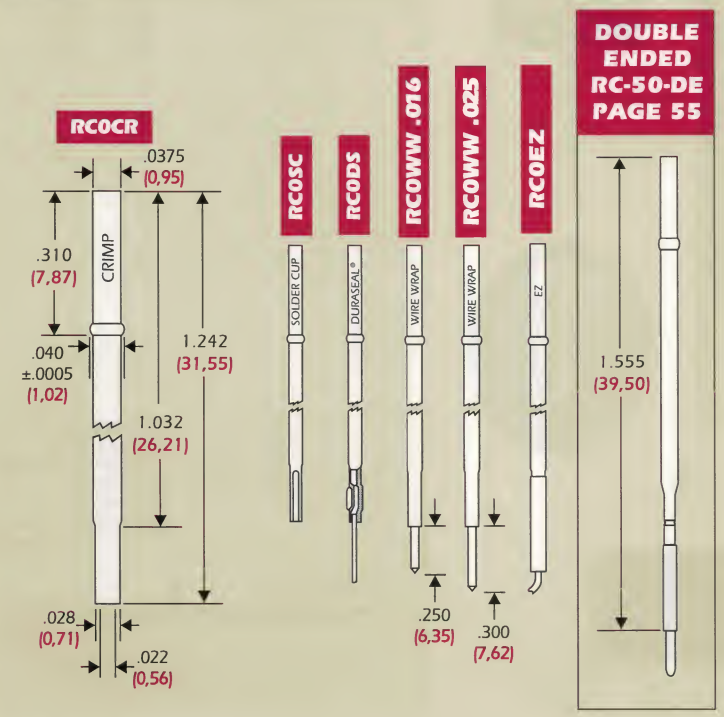
View updates of this information at http://www.idinet.com

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

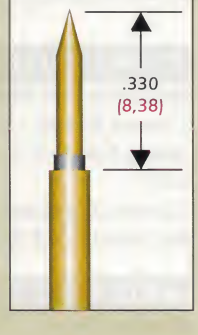
RECEPTACLE SIZE RC0

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style DS: DuraSeal, vacuum sealed, 30 GA wire
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style EZ: Wire plug, 30 GA
Recommended Wire: 28-30 GA
Material: Beryllium copper, gold plated



Drill Size: #61
Mounting Hole Size: .0385/.0390 (0,98/0,99)

Probe Extension from Receptacle

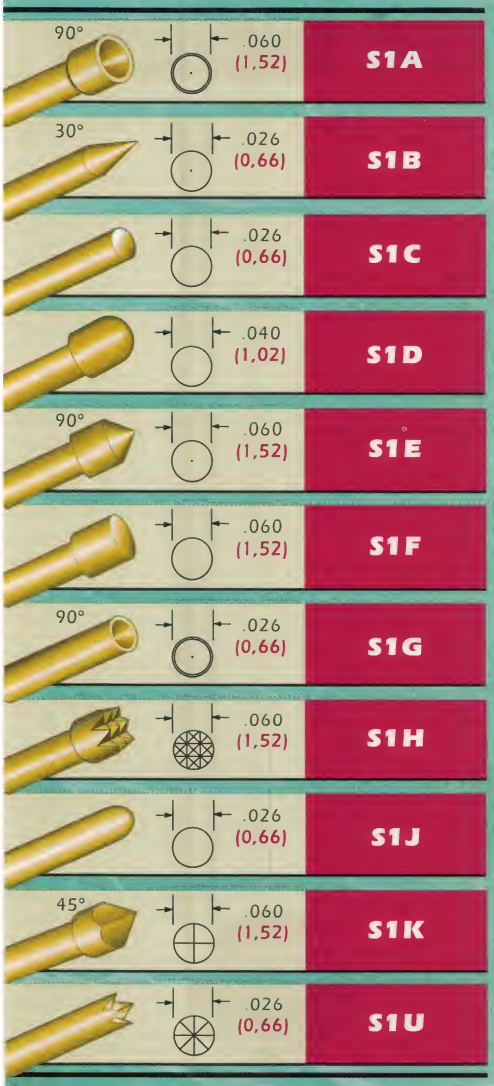


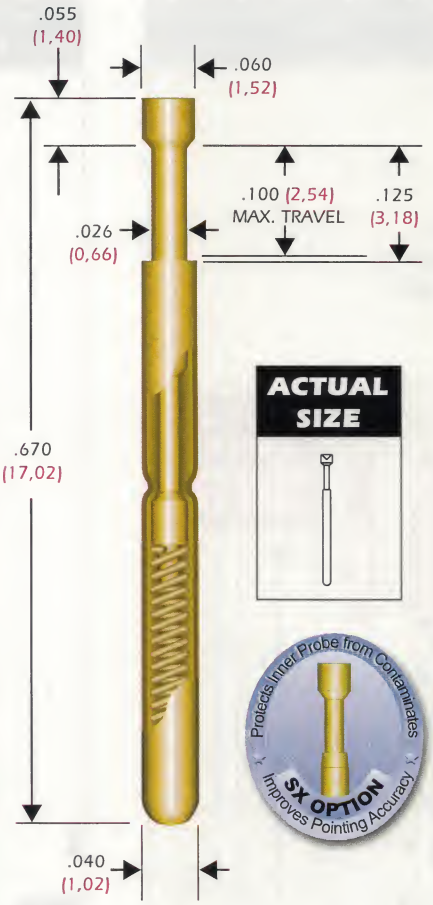
Specifications subject to change without notice.
Dimensions in inches (millimeters)

ICT OPTION PAGE 47

ROTATOR OPTION PAGE 53

SERIES S — SIZE 1 — .075 CENTERS





SPRING FORCE @ .070 (1,78) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
2.0 (57)	0.8 (23)	Stainless Steel
3.8 (108)	1.5 (43)	Stainless Steel
6.6 (187)	2.0 (57)	Music Wire

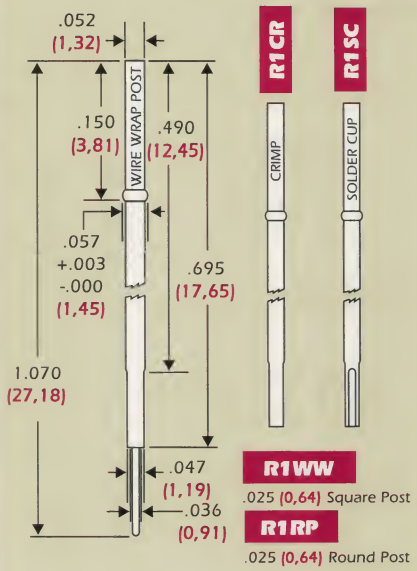
Additional forces and materials available, consult factory.

RECEPTACLE SIZE 1

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup

Recommended Wire: 24-28 GA

Material: Nickel/silver, gold plated, Gold plated post



Drill Size: 1,45mm
Mounting Hole Size: .055/.057 (1,40/1,45)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

S	1	A	3.8	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

S—Standard Series
SX—Improved Pointing Accuracy

2.0—2.0 oz. @ .070 (1,78) travel
3.8—3.8 oz. @ .070 (1,78) travel
6.6—6.6 oz. @ .070 (1,78) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

View updates of this information at http://www.idinet.com

CRIMPING PLIERS—CP1
INSERTION TOOL—RT1

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.075 (1,91)
Current Rating—3 amps continuous
Spring Force—2.0, 3.8 or 6.6 oz. @ .070 (1,78) travel
Contact Resistance—Less than 25 milliohms
Recommended Working Travel—.070 (1,78)

MATERIALS

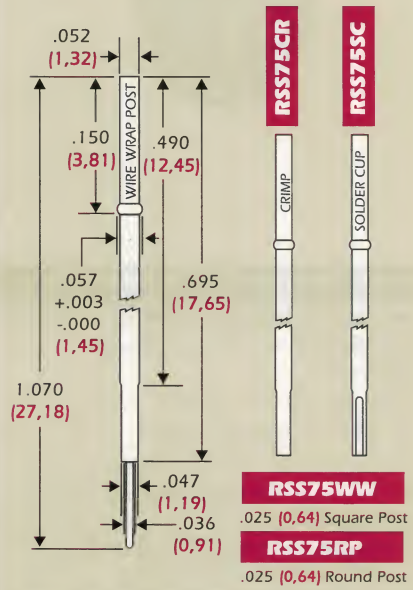
Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

RECEPTACLE SIZE SS75

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup

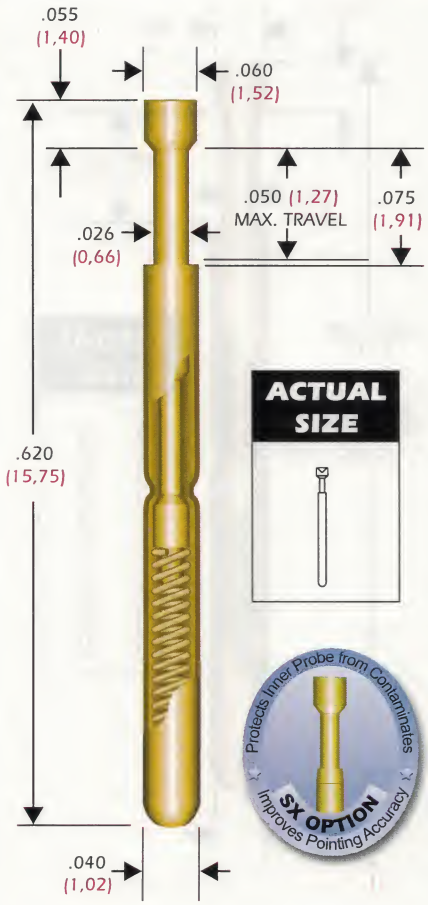
Recommended Wire: 24-28 GA

Material: Nickel/silver, gold plated
Gold plated post



Drill Size: 1,45mm
Mounting Hole Size: .055/.057
(1,40/1,45)

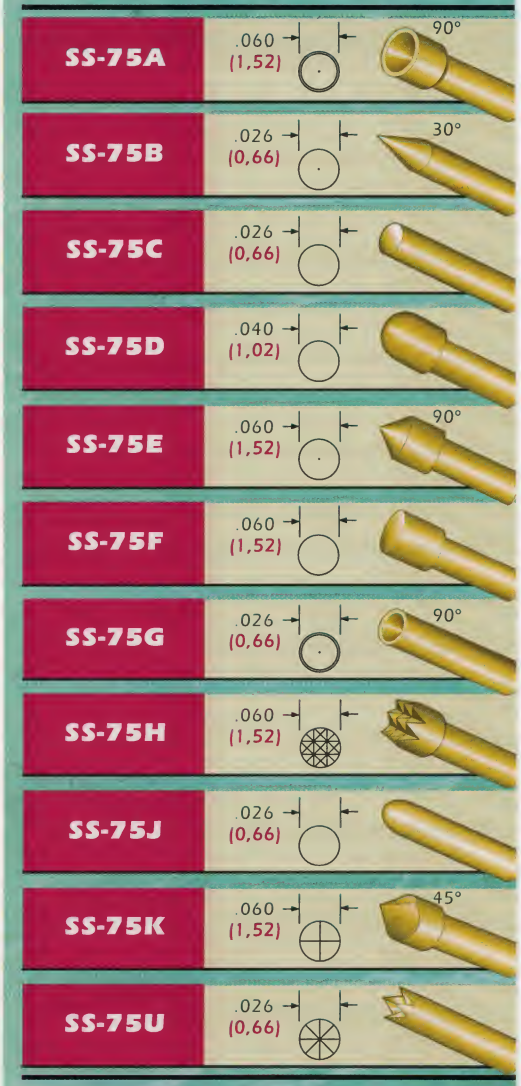
Specifications subject to change without notice.
Dimensions in inches (millimeters)



SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
2.4 (68)	1.7 (48)	Stainless Steel
4.9 (139)	3.1 (88)	Stainless Steel

Additional forces and materials available, consult factory.

SERIES SS



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.075 (1,91)
Current Rating—3 amps continuous
Spring Force—2.4 or 4.9 oz. @ .050 (1,27) travel
Contact Resistance—Less than 25 milliohms
Recommended Working Travel—.050 (1,27)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SS	75	A	2.4	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

SS—Standard Series
SSX—Improved Pointing Accuracy

2.4—2.4 oz. @ .050 (1,27) travel
4.9—4.9 oz. @ .050 (1,27) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

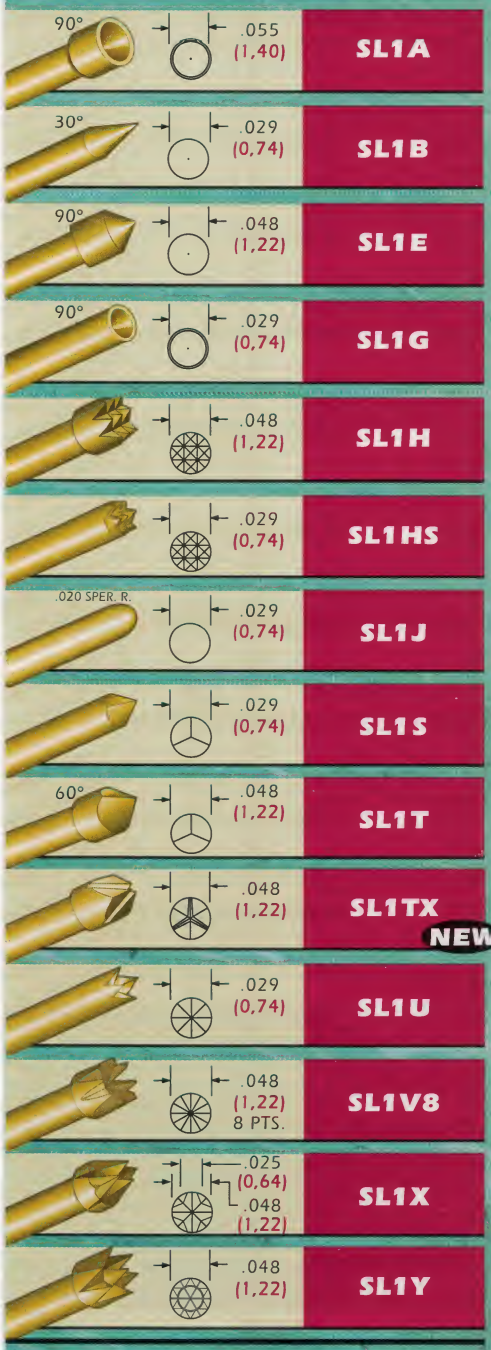
CRIMPING PLIERS—CPSS75
INSERTION TOOL—RTSS75

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

BECU PLUNGERS



MAX. STROKE (RATED TRAVEL)	SPRING FORCE @ RATED TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
.250 (.170)	3.8 (108)	0.5 (14)
	6.6 (187)	1.6 (45)
.160 (.107)	4.0 (113)	2.1 (59)

Additional forces and materials available, consult factory.

FLUXBUSTERS FOR NO-CLEAN TESTING

Protects Inner Probe from Contaminates — SX OPTION Improves Pointing Accuracy

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.075 (1,91)
Current Rating—3 amps continuous
Spring Force—
- 4.0 oz. @ .107 (2,72) travel for .160 (4,06) maximum travel
- 3.8 or 6.6 oz. @ .170 (4,32) travel for .250 (6,35) maximum travel

Contact Resistance—
Standard Series: Less than 25 milliohms
DuraGold®: Less than 13 milliohms
Recommended Working Travel—
- .107 (2,72) for .160 maximum travel
- .170 (4,32) for .250 maximum travel

MATERIALS

Contact Barrel—Nickel/silver, gold plated or DuraGold®
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper or steel, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SL **1** **A** **3.8** **G** **S** **250**

SERIES
SL—Standard Series
SXL—Improved Pointing Accuracy

SIZE

TIP STYLE

CRIMPING PLIERS—CPRL1
INSERTION TOOL—RTRL1

SPRING FORCE for .250 (6,35) Max. Travel
3.8—3.8 oz. @ .170 (4,32) travel
6.6—6.6 oz. @ .170 (4,32) travel
for .160 (4,06) Max. Travel
4.0—4.0 oz. @ .107 (2,72) travel

PLATING OPTIONS
G—Gold Plated Plunger, Gold Plated Barrel
D—Duralloy™ Plated Plunger, Gold Plated Barrel
DG—Gold Plated Plunger, DuraGold® Barrel
DGD—Duralloy™ Plated Plunger, DuraGold® Barrel

STEEL PLUNGER OPTION

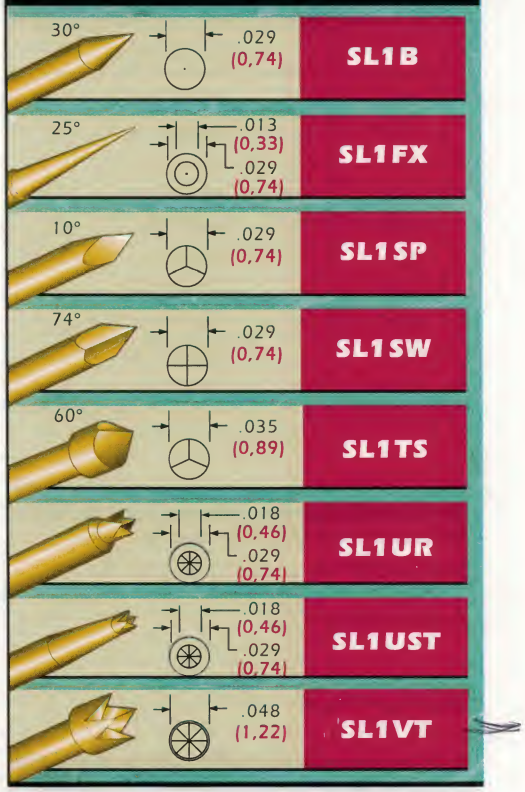
Max. Travel
250—.250 (6,35) max. travel
160—.160 (4,06) max. travel

RECEPTACLE HOW TO ORDER—
The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

STEEL PLUNGERS



RECEPTACLE SIZE RL1

Connections:

Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available

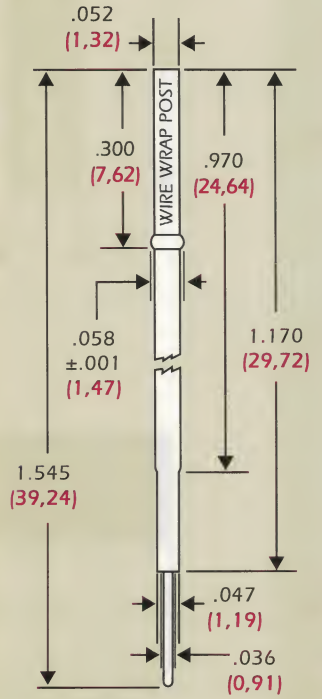
Style RP: Round Post .375 (9,53) post length

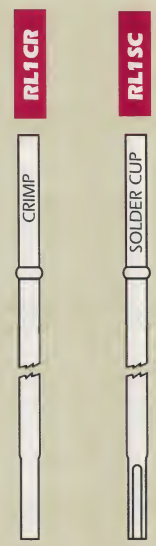
Style CR: Crimp

Style SC: Solder Cup

Recommended Wire: 24-28 GA

Material: Nickel/silver, gold plated, gold plated post





RL1WW
.025 (0,64) Square Post

RL1RP
.025 (0,64) Round Post

DOUBLE ENDED R-75J-DE PAGE 55

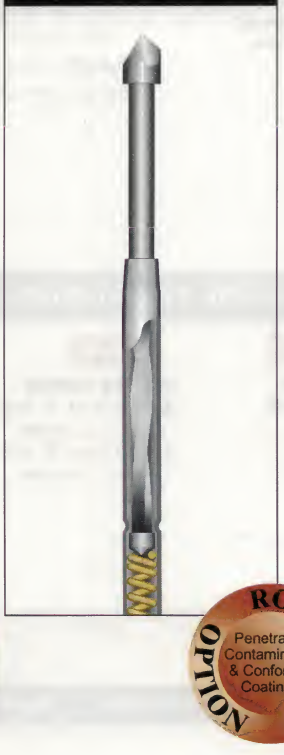
Drill Size: 1,45mm

Mounting Hole Size: .055/.057 (1,40/1,45)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

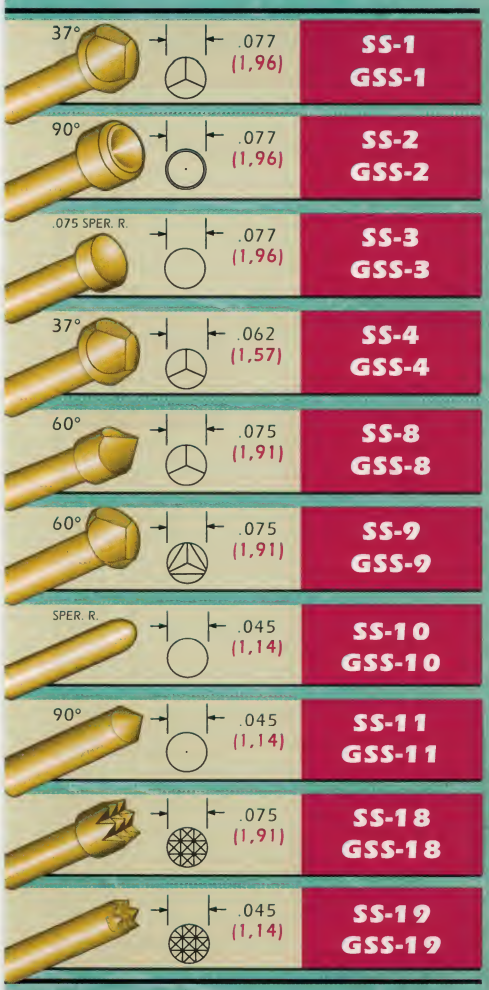
ICT OPTION PAGE 45

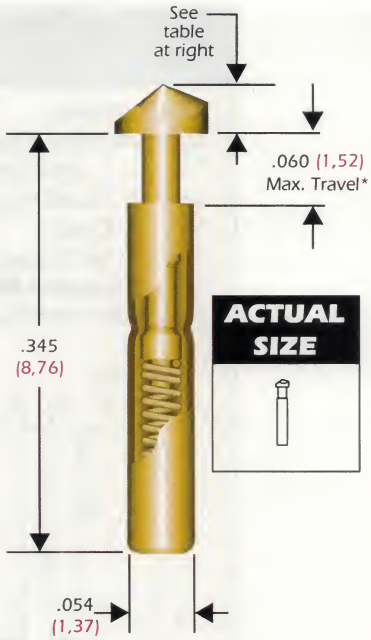
ROTATOR OPTION PAGE 51



Series SS-100/ GSS-100

.100 Centers





HEAD LENGTH BY TIP STYLE	
TIP	HEAD LENGTH
SS1	.040 (1,02)
SS2	.028 (0,71)
SS3	.028 (0,71)
SS4	.040 (1,02)
SS8	.080 (2,03)
SS9	.050 (1,27)
SS10	.028 (0,71)
SS11	.040 (1,02)
SS18	.060 (1,52)
SS19	.055 (1,40)

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—3.8 or 7.0 oz. @ .050 (1,27) travel
Contact Resistance—
SS: Less than 65 milliohms
GSS: Less than 30 milliohms
Maximum Travel—.060 (1,52)
*for SS-8 .050 (1,27)

SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
3.8 (108)	1.6 (45)	Stainless Steel
7.0 (198)	1.3 (37)	Music Wire

Additional forces and materials available, consult factory.

MATERIALS

Contact Barrel—
SS: Nickel/silver
GSS: Nickel/silver, gold plated
Spring—
SS: Stainless steel or music wire
GSS: Stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel

HOW TO ORDER

SS — **SERIES**
SS—Nickel/Silver Barrel
GSS—Gold Plated Barrel

1 — **TIP STYLE**

3.8 — **SPRING FORCE**
3.8—3.8 oz. @ .050 (1,27) travel
7.0—7.0 oz. @ .050 (1,27) travel

G — **PLATING OPTIONS**
G—Gold Plated Plunger

CRIMPING PLIERS—CPSS100
INSERTION TOOL—RTSS100

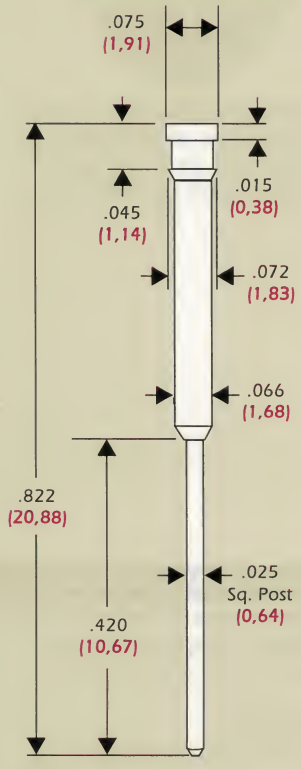
RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

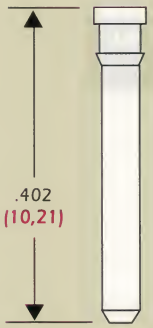
FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

SHORT STROKE RECEPTACLES
SIZE SS-100/GSS-100

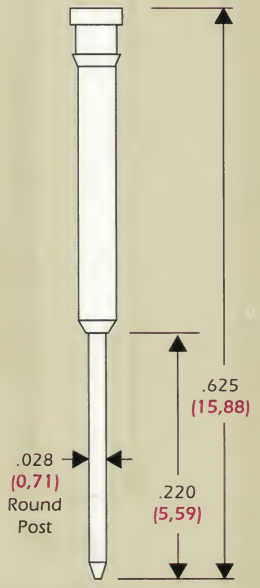
RSS100WW



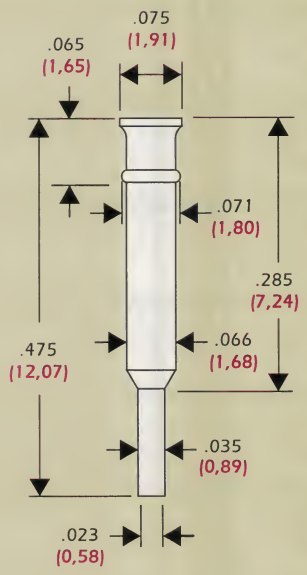
RSS100NT



RSS100RP



RSS100CR

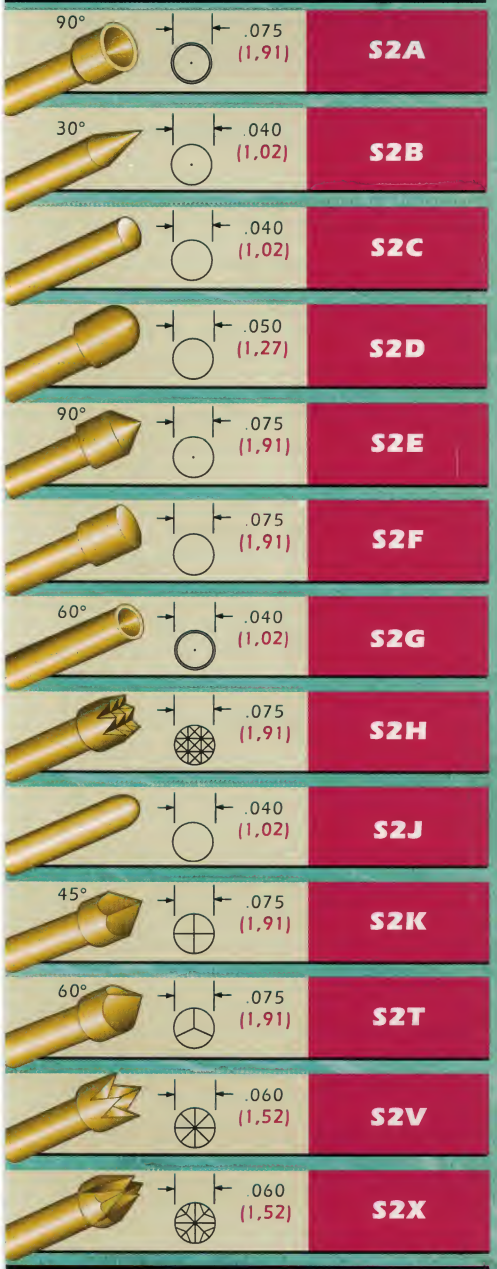


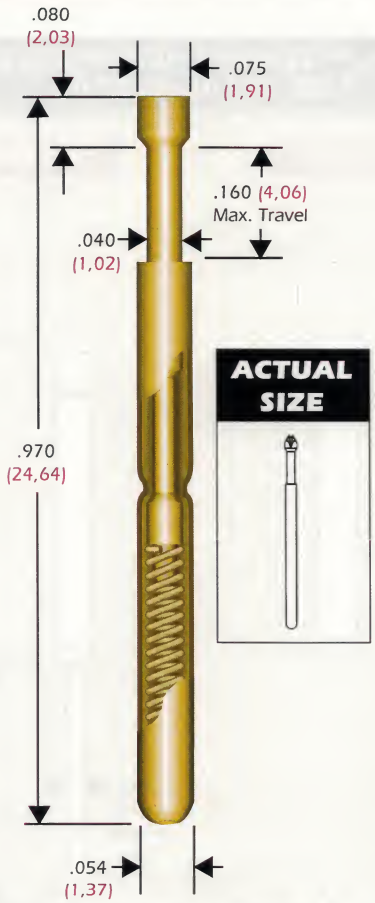
Connections:
Style WW: Wire Wrapped post
Style NT: No Tail
Style RP: Round Post
Style CR: Crimp

Recommended Wire: 28-30 GA
Material: Nickel/silver

Drill Size: #50
Mounting Hole Size: .068/.070 (1,73/1,78)

Specifications subject to change without notice.
Dimensions in inches (millimeters)





SPRING FORCE @ .100 (2,54) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
4.0 (113)	1.6 (45)	BeCu
7.0 (198)	2.9 (82)	BeCu
8.3 (235)	3.3 (93)	Music Wire
10.0 (283)	3.9 (110)	Music Wire

Additional forces and materials available, consult factory.

Improves pointing accuracy by a minmum of 50% and protects the inner portion of the probe from contaminants.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—4.0, 7.0, 8.3 or 10.0 oz. @ .100 (2,54) travel
Contact Resistance—
Economy: Less than 60 milliohms
Standard: Less than 35 milliohms
Recommended Working Travel—.100 (2,54)

MATERIALS

Contact Barrel—
Economy: Nickel/silver
Standard: Nickel/silver, gold plated
Spring—Beryllium copper, precious metal plated or music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

S	2	A	4.0	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

S—Gold Plated Barrel
SE—Nickel/Silver Barrel
SX—Improved Pointing Accuracy, Gold Plated Barrel

4.0—4.0 oz. @ .100 (2,54) travel
7.0—7.0 oz. @ .100 (2,54) travel
8.3—8.3 oz. @ .100 (2,54) travel
10.0—10.0 oz. @ .100 (2,54) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

CRIMPING PLIERS—CP2
INSERTION TOOL—RT2

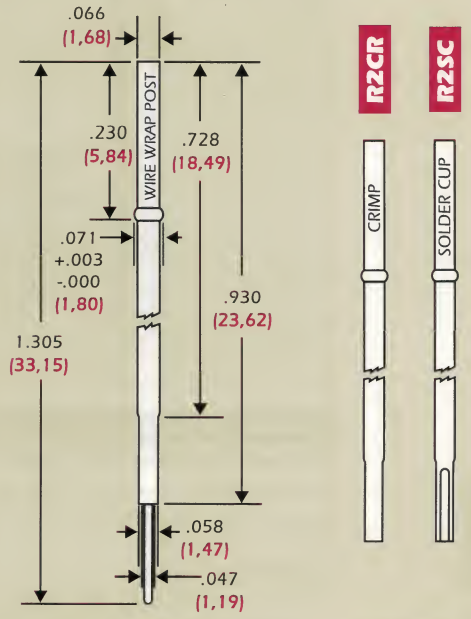
RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

RECEPTACLE SIZE 2

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup
Recommended Wire: 22-26 GA
Series R, Standard
Material: Nickel/silver, gold plated, gold plated post
Series RE, Economy
Material: Nickel/silver, gold plated post



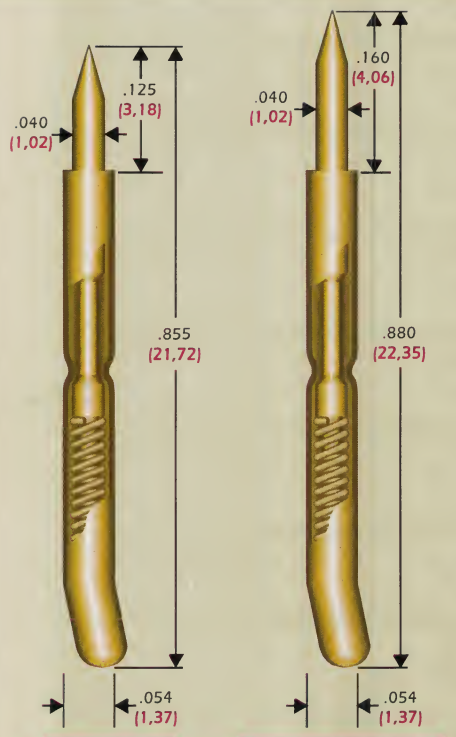
R2WW
.025 (0,64) Square Post

R2RP
.025 (0,64) Round Post

Drill Size: #50
Mounting Hole Size: .068/.070 (1,73/1,78)

Specifications subject to change without notice. Dimensions in inches (millimeters)

GENRAD INTERFACE PROBES



SPGR2B4G **SPGR2B3.7G .880**

Note: For Genrad Interface Probes with no bend in barrel, consult factory.

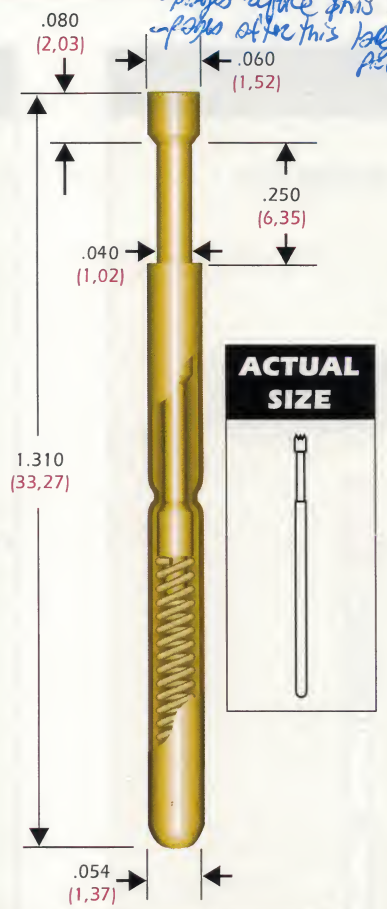
SERIES S

SIZE 25

.100 CENTERS

BECU PLUNGERS

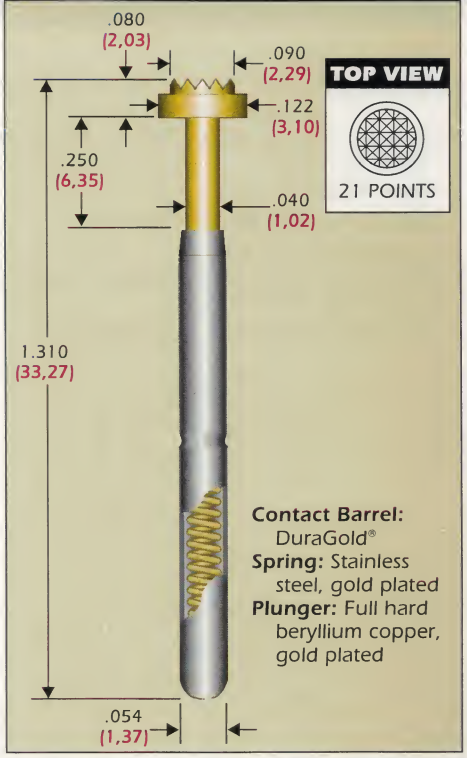
90°	.060 (1,52)	S25A
30°	.040 (1,02)	S25B
	.040 (1,02)	S25C
	.050 (1,27)	S25D
90°	.060 (1,52)	S25E
	.060 (1,52)	S25F
60°	.040 (1,02)	S25G
	.060 (1,52)	S25H
	.075 (1,91)	S25HK
	.093 (2,36)	S25HL
	.040 (1,02)	S25J
45°	.060 (1,52)	S25K
90°	.060 (1,52)	S25LM
60°	.040 (1,02)	S25S
60°	.060 (1,52)	S25T
60°	.060 (1,52)	S25TX NEW
	.060 (1,52)	S25V
	.050 (1,27)	S25W



SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
4.0 (113)	1.5 (43)
5.5 (156)	2.0 (57)
6.7 (190)	1.5 (43)
8.0 (227)	2.8 (80)
10.0 (283)	1.8 (51)

Additional forces and materials available, consult factory.

SX-25-HP-3.5-DG



Contact Barrel: DuraGold®
Spring: Stainless steel, gold plated
Plunger: Full hard beryllium copper, gold plated

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—4.0, 5.5, 6.7, 8.0 or 10.0 oz. @ .170 (4,32) travel
Contact Resistance—
Economy: Less than 70 milliohms
Standard: Less than 25 milliohms
DuraGold®: Less than 13 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—Nickel/silver, nickel/silver gold plated or DuraGold®
Spring—Music wire, precious metal plated (stainless steel available in 4.0 and 6.7 oz.)
Plunger—Full-hard beryllium copper or steel, gold plated over nickel or optional Duralloy™

HOW TO ORDER

S	25	A	4.0	G	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTIONS

S—Standard Series: Gold Plated, DuraGold® Barrel
SE—Economy Series: Nickel/Silver Barrel
SX—Improved Pointing Accuracy, Standard Series

4.0—4.0 oz. @ .170 (4,32) travel
5.5—5.5 oz. @ .170 (4,32) travel
6.7—6.7 oz. @ .170 (4,32) travel
8.0—8.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel

G—Gold Plated Plunger, Gold Plated or Nickel/Silver Barrel
D—Duralloy™ Plated Plunger, Gold Plated or Nickel/Silver Barrel
DG—Gold Plated Plunger, DuraGold® Barrel
DGD—Duralloy™ Plated Plunger, DuraGold® Barrel

CRIMPING PLIERS—CP25
INSERTION TOOL—RT25

View updates of this information at http://www.idinet.com

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

Interconnect Devices, Inc. welcomes your e-mail at info@idinet.com

FLUXBUSTERS™ FOR NO-CLEAN TESTING

ROTATOR OPTION™ Penetrates Contaminates & Conformal Coatings

SX OPTION Protects Inner Probe from Contaminates Improves Pointing Accuracy

BECU PLUNGERS CONTINUED

30°, .025 DIA., .060 (1,52)	S25X
.055 (1,40)	S25Y
.056 (1,42)	S25NT
.025 (0,64), .040 (1,02)	S25HT
.023 (0,58), .040 (1,02)	S25H4T
.011 (0,28), .040 (1,02)	S25UT

STEEL PLUNGERS

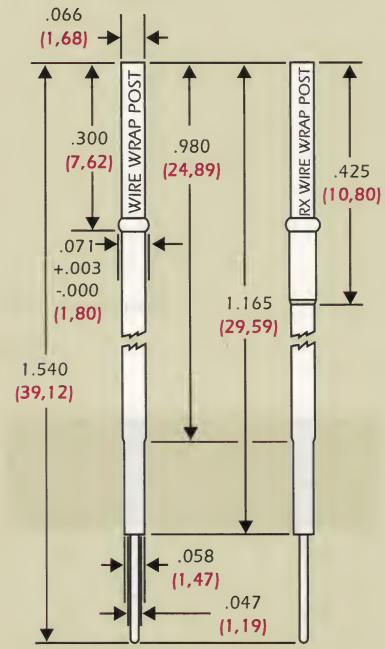
30°, .040 (1,02)	S25B
25°, .013 (0,33), .040 (1,02)	S25FX
.060 (1,52)	S25H
.056 (1,42)	S25NT
15°, .030 (0,76)	S25SN
10°, .040 (1,02)	S25SP
15°, .040 (1,02)	S25SPB
74°, .040 (1,02)	S25SW
60°, .060 (1,52)	S25T
.040 (1,02)	S25U
.018 (0,46), .040 (1,02)	S25UR

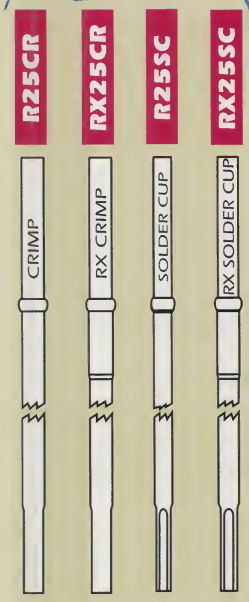
RECEPTACLE SIZE 25

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup
Recommended Wire: 22-26 GA
Series R, Standard; Series RX, Improved Pointing Accuracy
Material: Nickel/silver, gold plated, gold plated post
Series RE, Economy; Series REX, Improved Pointing Accuracy
Material: Nickel/silver, gold plated post

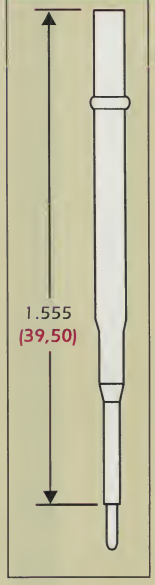
holds probes in place

Receptacles that go into fixture.





DOUBLE ENDED R-100J-DE PAGE 55



R25WW .025 (0,64) Square Post

RX25WW .025 (0,64) Square Post

R25RP .025 (0,64) Round Post

RX25RP .025 (0,64) Round Post

Drill Size: #50
Mounting Hole Size: .068/.070 (1,73/1,78)

Specifications subject to change without notice. Dimensions in inches (millimeters)

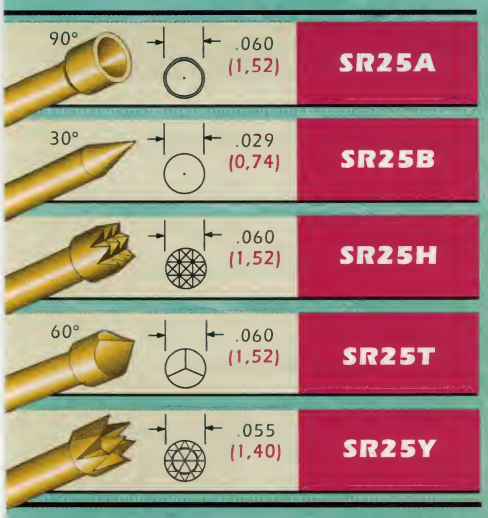
STEEL PLUNGERS CONTINUED

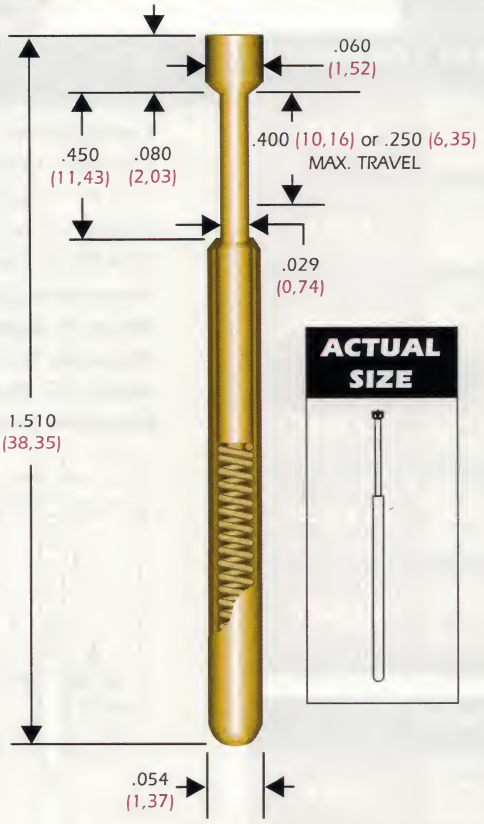
.020 (0,51), .040 (1,02)	S25UST
.050 (1,27)	S25W
.050 (1,27)	S25WO
.055 (1,40)	S25Y

ICT Lowest, Most Consistent Resistance Unbeatable Pointing Accuracy

Improves yields, increases through-put, more accurate measurement of critical components, reduced probe related false opens, more repeatable test results.
See page 44.

SIZE 25 .100 CENTERS





MAX. STROKE (RATED TRAVEL)	SPRING FORCE @ RATED TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
.400 (.267)	5.5 (156)	1.6 (45)
.250 (.167)	6.3 (179)	3.6 (102)

Additional forces and materials available, consult factory.

See page 83 of the Source Book for dual level fixturing information.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—6.3 oz. @ .167 (4,24) travel
5.5 oz. @.267 (6,78) travel
Contact Resistance—Less than 35 milliohms
Recommended Working Travel—
.167 (4,24) for .250 (6,35) stroke
.267 (6,78) for .400 (10,16) stroke

MATERIALS

Contact Barrel—Nickel/silver, gold plated or DuraGold®
Spring—Music wire, precious metal plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

SR	25	A	5.5	G	400
SERIES	SIZE	TIP STYLE	SPRING FORCE .400 (10,16) Max.Travel **5.5**—5.5 oz. @ .267 (6,78) travel .250 (6,35) Max.Travel **6.3**—6.3 oz. @ .167 (4,24) travel	PLATING OPTIONS **G**—Gold Plated Plunger, Gold Plated Barrel **D**—Duralloy™ Plated Plunger, Gold Plated Barrel **DG**—Gold Plated Plunger, DuraGold® Barrel **DGD**—Duralloy™ Plated Plunger, DuraGold® Barrel	MAX. TRAVEL **400**—.400 (10,16) max.travel **250**—.250 (6,35) max.travel

CRIMPING PLIERS—CP25
INSERTION TOOL—RT25

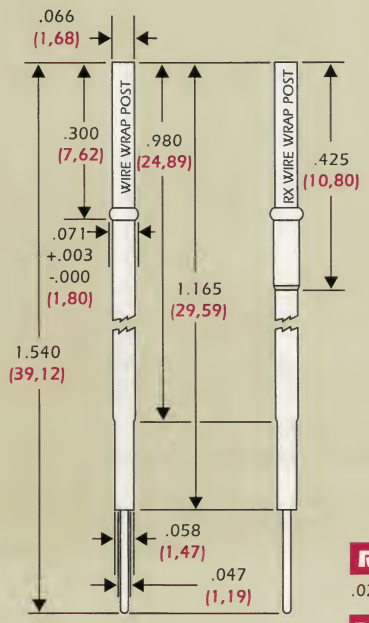
RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

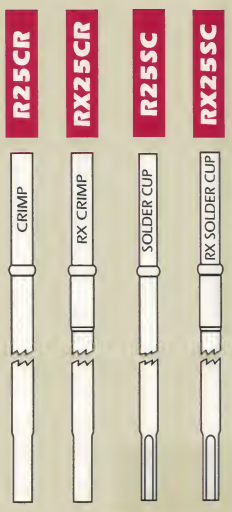
View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

RECEPTACLE SIZE 25

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup
Recommended Wire: 22-26 GA
Series R, Standard; Series RX, Improved Pointing Accuracy
Material: Nickel/silver, gold plated, gold plated post
Series RE, Economy; Series REX, Improved Pointing Accuracy
Material: Nickel/silver, gold plated post





R25WW .025 (0,64) Square Post
RX25WW .025 (0,64) Square Post
R25RP .025 (0,64) Round Post
RX25RP .025 (0,64) Round Post

Drill Size: #50
Mounting Hole Size: .068/.070 (1,73/1,78)

Specifications subject to change without notice. Dimensions in inches (millimeters)

TRI-NEEDLE .100 (2,54) CENTERS

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—4.0, 5.5, 6.7, 8.0 or 10.0 oz. @.170 (4,32) travel
Recommended Working Travel—.170 (4,32)
Minimum Travel—.250 (6,35)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Music wire, precious metal plated
Plunger—Steel, gold plated—nickel plated needles

HOW TO ORDER

S	25	TN	6.7	EN
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

SPRING FORCE
4.0—4.0 oz. @ .170 (4,32) travel
5.5—5.5 oz. @ .170 (4,32) travel
6.7—6.7 oz. @ .170 (4,32) travel
8.0—8.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel

PLATING OPTIONS
EN—Gold Plated Shaft Nickel Plated Needles

CRIMPING PLIERS—CP25
INSERTION TOOL—RT25

View updates of this information at http://www.idinet.com

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

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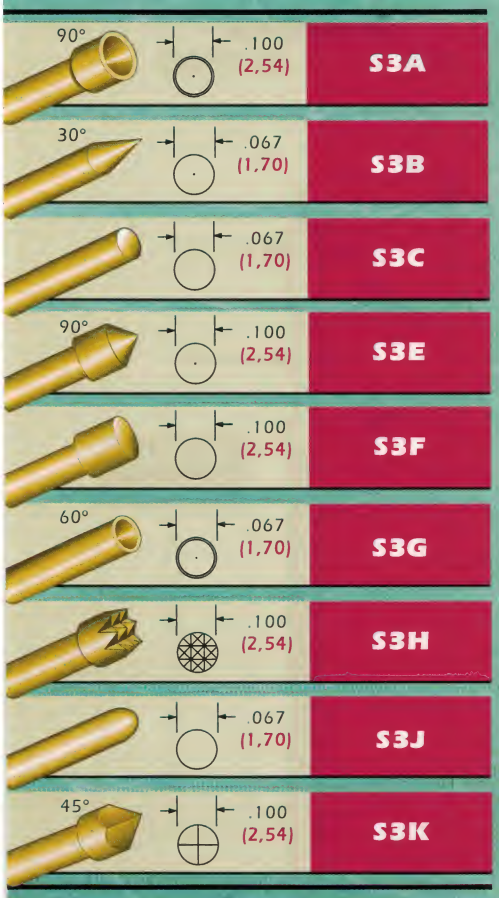
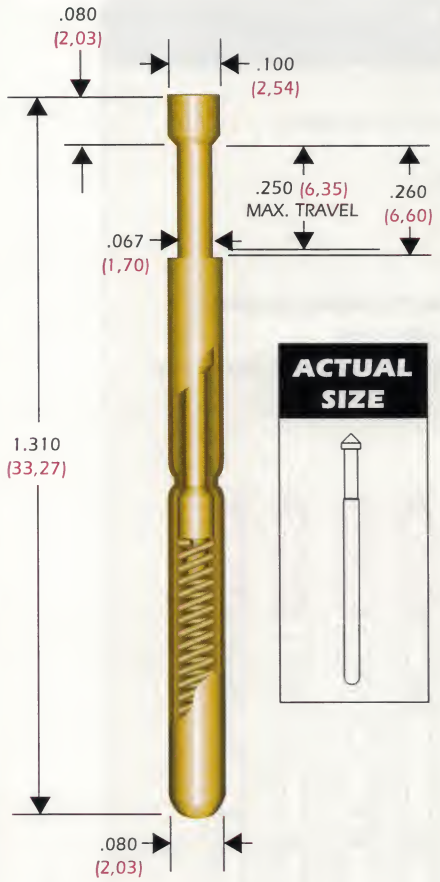




SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
4.0 (113)	1.8 (51)
7.0 (198)	2.9 (82)

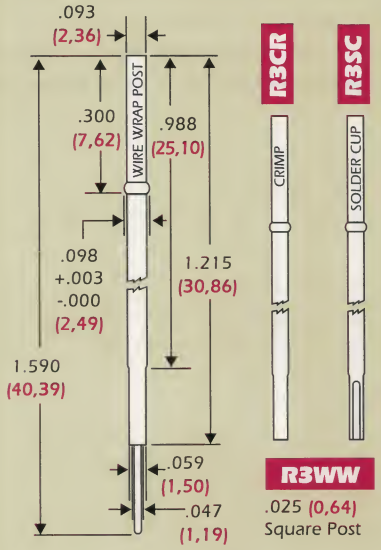
Additional forces and materials available, consult factory.

RECEPTACLE SIZE 3

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style CR: Crimp
Style SC: Solder Cup

Recommended Wire: 22-26 GA

Material: Nickel/silver, gold plated
Gold plated post



Drill Size: #41
Mounting Hole Size: .094/.096 (2,39/2,44)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

S	3	A	4	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

4.0—4.0 oz. @ .170 (4,32) travel
7.0—7.0 oz. @ .170 (4,32) travel

G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

CRIMPING PLIERS—CP3
INSERTION TOOL—RT3

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.125 (3,18)
Current Rating—5 amps continuous
Spring Force—4.0, or 7.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 20 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

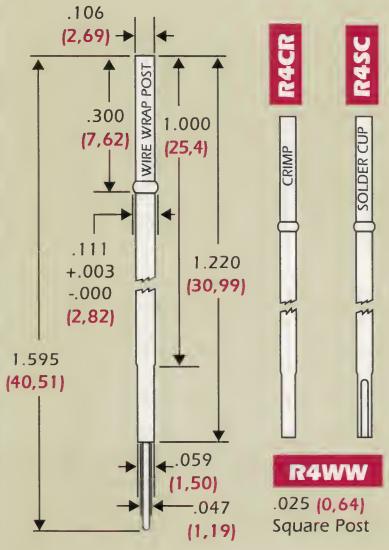
FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

RECEPTACLE SIZE 4

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style CR: Crimp
Style SC: Solder Cup

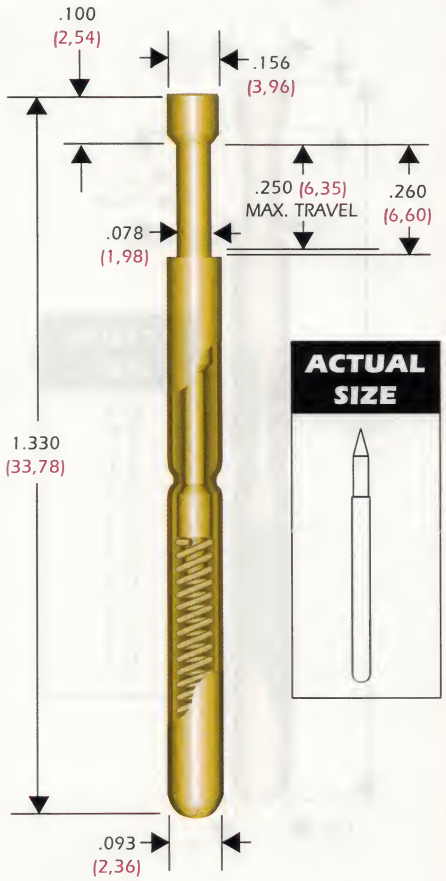
Recommended Wire: 22-26 GA

Material: Nickel/silver, gold plated
Gold plated post



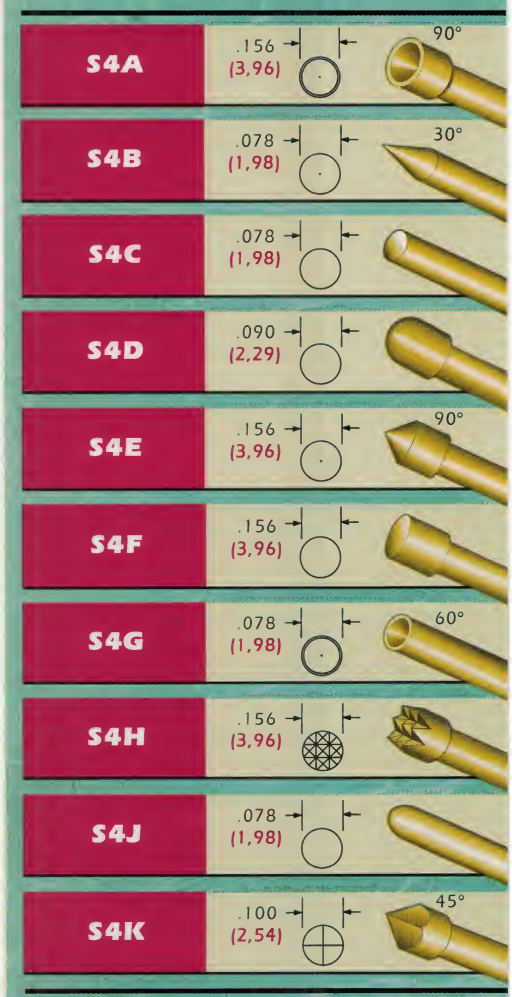
Drill Size: #35
Mounting Hole Size: .108/.110 (2,74/2,79)

Specifications subject to change without notice.
Dimensions in inches (millimeters)



SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
5.0 (142)	2.0 (57)
7.0 (198)	2.8 (79)

Additional forces and materials available, consult factory.



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—
.156 (3,96) B, C, D, G, J, K Tip Styles
.187 (4,75) A, E, F, H Tip Styles
Current Rating—5 amps continuous
Spring Force—5.0 or 7.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 20 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

HOW TO ORDER

S	4	A	5	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

5.0—5.0 oz. @ .170 (4,32) travel
7.0—7.0 oz. @ .170 (4,32) travel

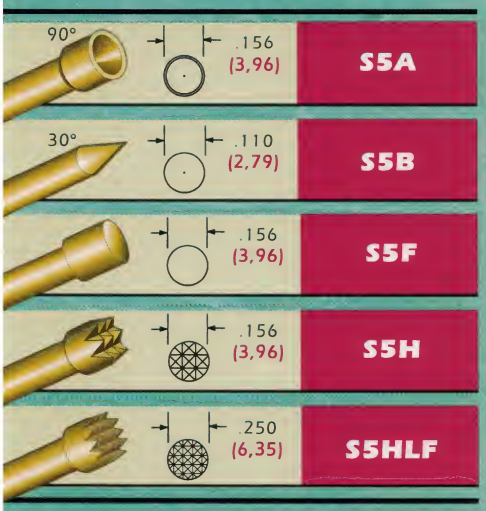
G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

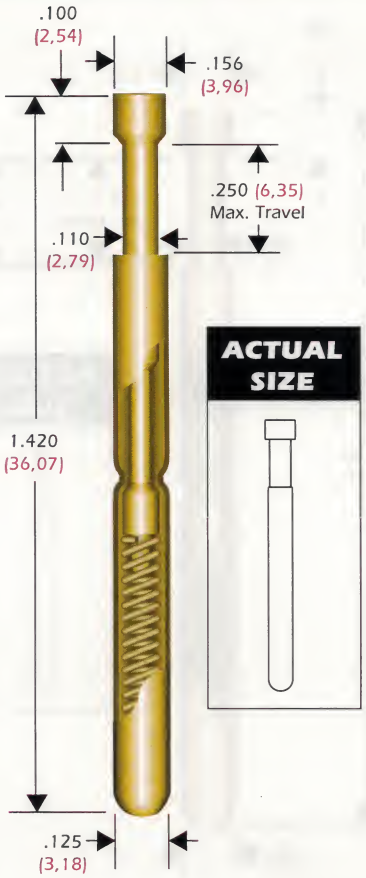
View updates of this information at http://www.idinet.com

CRIMPING PLIERS—CP4
INSERTION TOOL—RT4

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com





SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)	
8.0 (227)	3.1 (88)	Stainless Steel
16.4 (465)	2.8 (79)	Music Wire

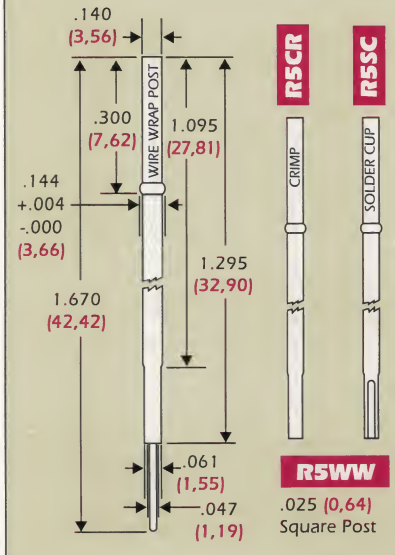
Additional forces and materials available, consult factory.

RECEPTACLE SIZE 5

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style CR: Crimp
Style SC: Solder Cup

Recommended Wire: 22-26 GA

Material: Nickel/silver, gold plated
Gold plated post



Drill Size: 3,60 mm
Mounting Hole Size: .141/.143 (3,58/3,63)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

S	5	A	16.4	G
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

SPRING FORCE
8.0—8.0 oz. @ .170 (4,32) travel
16.4—16.4 oz. @ .170 (4,32) travel

PLATING OPTIONS
G—Gold Plated Plunger
D—Duralloy™ Plated Plunger

View updates of this information at http://www.idinet.com

CRIMPING PLIERS—CP5
INSERTION TOOL—RT5

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.187 (4,75)
Current Rating—5 amps continuous
Spring Force—8.0, or 16.4 oz. @ .170 (4,32) travel
Contact Resistance—Less than 8 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Music wire or stainless steel
Plunger—Full-hard beryllium copper, gold plated over nickel or optional Duralloy™

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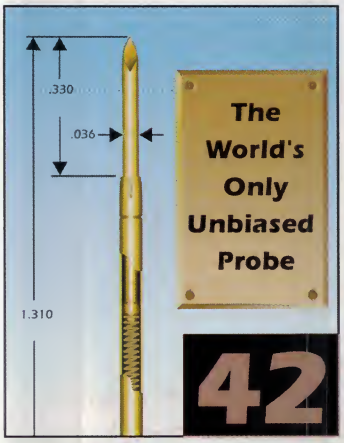
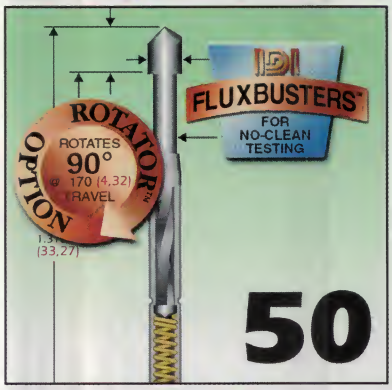
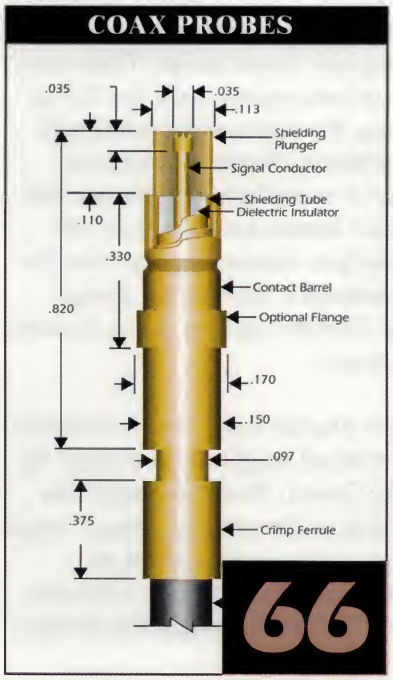
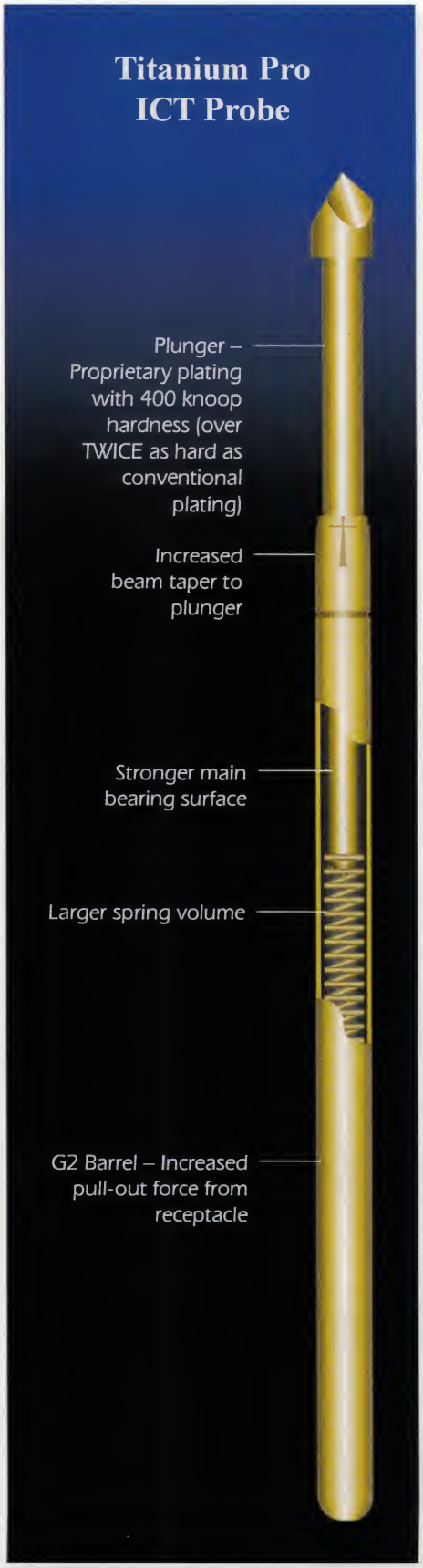






The Titanium Pro ICT™ Series.
Advancing Industry Standards. Again.



One of the most celebrated award winning probe designs ever introduced, the ICT Probe Series has completely revolutionized in-circuit testing. The ICT probe was not just another new probe design, but a design that marked a major change in probe construction. As test engineers witnessed the lowest and most consistent resistance they had ever measured on test probes, the standby bias designs gave way to the ICT Probe Series. With this catalog, we introduce the next generation: The Titanium Pro ICT Series. While other probe companies continue to focus on the out-dated bias designs introduced over 30 years ago, IDI continues to enhance our revolutionary probe designs, making advancements that set new industry standards.

Bifurcation versus Bias Design

In the past, probe designs have relied on biasing techniques to ensure positive electrical contact between the plunger and the barrel. In essence, the plunger of the probe is forced to an angle inside the barrel to provide two solid contact points for current transfer. The clearance between the plunger and barrel is typically .002" (0,05mm) in this type of design. While seemingly small, this clearance is an avenue for contamination to enter the internal portion of the probe, blocking or severely affecting the current transfer. Another consideration of a bias design is the effect on pointing accuracy. In a bias design, the plunger is forced to an angle inside the barrel, forcing the probe to its worst case pointing accuracy to ensure positive electrical contact.

The ICT Series probes are not biased. There is no clearance between the plunger and barrel. These probes use proven pin and socket connector technology to ensure positive electrical contact between the plunger and barrel. The top of the barrel is machined and coined to form four bifurcated beams. These beams provide a compliant fit between the plunger and barrel, absorbing manufacturing tolerances, gently wiping the plunger shaft on every deflection, and forcing the plunger to perfect center. This guarantees every plunger is in contact with every barrel 100% of the time without biasing. The result is the lowest and most consistent resistance of any probe on the market. Additionally, the elimination of the clearance between the plunger and the barrel virtually seals the internal portion of the probes from contaminants and provides the absolute best pointing accuracy available.

The Titanium Pro Advantage

The Titanium Pro ICT Series probes have all the advantages of the first generation ICT probes. The absolute best pointing accuracy. The absolute lowest and most consistent resistance. However, we didn't earn our reputation for being the innovators in probe technology by resting on our laurels. We always strive for perfection. We always find room for improvement.

The Titanium Pro ICT Series features an improved plunger design and a corresponding new beam design. These new design enhancements make the Ti-Pro so strong, the barrel of the probe will bend before the beams will deform. During the manufacturing process, the bifurcated beams are customized for each plunger, eliminating any manufacturing tolerance between the plunger outside diameter and the inside diameter of the beams.

The new plunger design has a reduction in the retained length of the plunger by .100" (2.54mm). In a bias design, the shortening of the retained plunger length has a dramatic negative effect on pointing accuracy. However, since the ICT design perfectly aligns the plunger

to the barrel, the shortening of the retained length of the plunger has minimal effect on pointing accuracy. This design also enables higher spring forces with longer spring volume. By increasing the area for the spring (length of the spring) while all other factors remain equal, the spring stress ratio is reduced allowing higher spring forces while eliminating tendencies for premature mechanical failure, specifically when over stroking occurs.

The Titanium Pro Series also features the latest advances in materials and platings. Advancement in heat treating makes our steel plunger harder than before, while retaining their elastic properties. The Ti-Pro probes also feature our new G2 proprietary barrel material and plating. Our G2 Barrel has a "less slick" fit between the barrel and receptacle to minimize any tendencies for probe "walk out." To further reduce probe walk out, IDI receptacles also feature 4 detents as compared to others' single detent design.

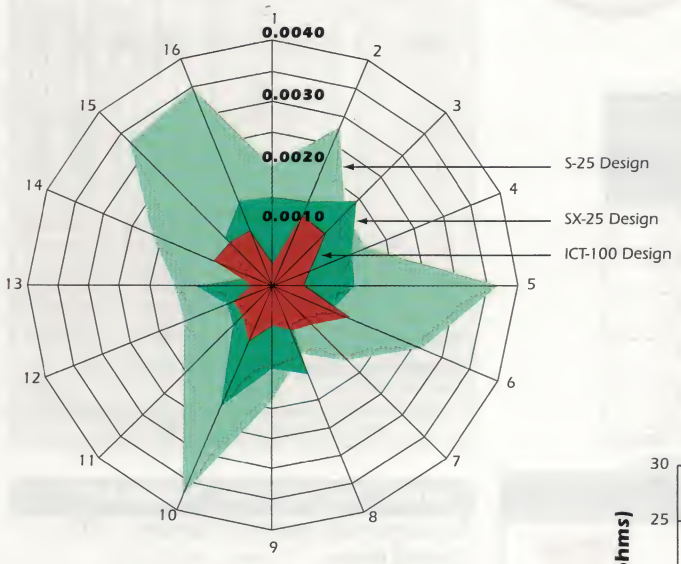
All Ti-Pro ICT Series probes feature our new revolutionary plunger plating. Through detailed design experiments, we have developed the hardest electro-deposited gold, reaching up to 400 knoop, over TWICE as hard as the standard cobalt gold plating commonly used in probes. The harder steel base material combined with the harder gold plating prolongs the tip and edge life of the plunger.

These new design features make the Ti-Pro Series by far the most robust in-circuit test probe. The compliant fit between the plunger and barrel, the gentle wiping of the plunger shaft during deflection, and the harder gold plating vastly reduce wear commonly seen as a black surface on the shaft of the plunger, resulting in longer probe life.

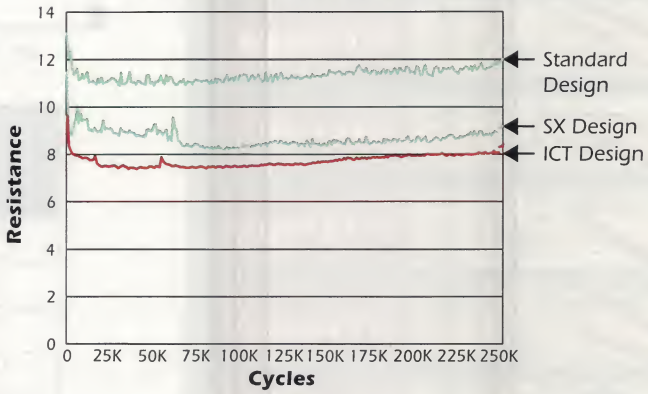
The Ti-Pro ICT Series is so unique, you can actually feel the difference for yourself. Our probes have a distinct feel when compressed. Compress one between your fingers. The friction you sense during deflection of the probe is normal and expected. It is your assurance that the probe is indeed providing the pointing accuracy and consistently low resistance we promise.

.100" (2,54) Centers, .250" (6,35) Maximum Travel

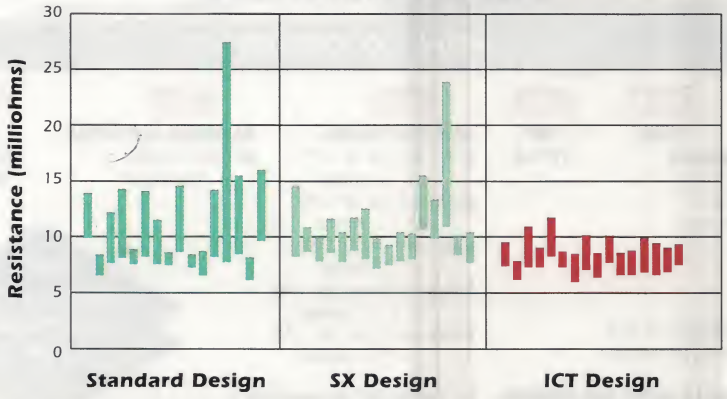
Pointing Accuracy



Average Resistance



Resistance Variation



SERIES ICT™ — SIZE 100 — .100 CENTERS

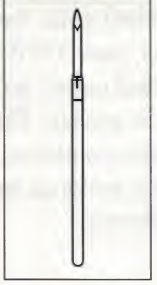
BECU PLUNGERS

.060 (1,52)	ICT-100H
60° .036 (0,91)	ICT-100S
60° .060 (1,52)	ICT-100T
60° .060 (1,52)	ICT-100TX

STEEL PLUNGERS

.055 (1,40)	ICT-100NT
60° .036 (0,91)	ICT-100S
10° .036 (0,91)	ICT-100SP
15° .036 (0,91)	ICT-100SPB
.036 (0,91)	ICT-100SW
.036 (0,91)	ICT-100U
.020 (0,51) .036 (0,91)	ICT-100UR
.050 (1,27)	ICT-100WO
.055 (1,40)	ICT-100Y

ACTUAL SIZE



Double Ended Receptacle See page 55 R-100-DE

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
5.5 (156)	2.4 (68)
6.7 (190)	2.8 (80)
8.0 (227)	3.3 (94)
10.0 (283)	3.7 (105)
17.0 (483)	3.0 (85)

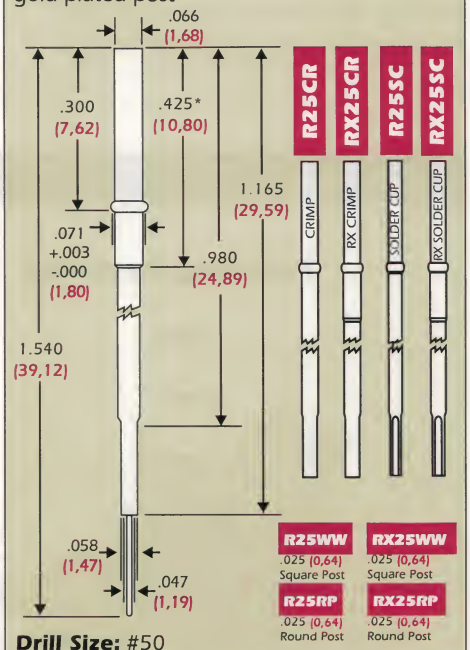
Additional forces and materials available, consult factory.

Designed Specifically for In-Circuit Test

IDI FLUXBUSTERS® FOR NO-CLEAN TESTING

RECEPTACLE ICT 100

Connections:
Style WW: Wire Wrap .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup
Recommended Crimped Wire Size: 22-26 GA
Series R, Standard
Series RX, Improved Pointing Accuracy
Material: Nickel/silver, gold plated, gold plated post



Drill Size: #50
Mounting Hole Size: .068/.070 (1,73/1,78)
*RX Series only
Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

ICT	100	T	5.5	G	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTION

SERIES — **New G2 Barrel** proprietary material and plating processes

SIZE

TIP STYLE

SPRING FORCE
5.5—5.5 oz. @ .170 (4,32) travel
6.7—6.7 oz. @ .170 (4,32) travel
8.0—8.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel
17.0—17.0 oz. @ .170 (4,32) travel

PLATING OPTIONS
G—400 knoop hard gold

STEEL PLUNGER OPTION

CRIMPING PLIERS—CP25
INSERTION TOOL—RT25

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—5.5, 6.7, 8.0, 10.0 or 17.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 8 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—G2
Spring—Music wire, precious metal plated
Plunger—Full-hard beryllium copper or steel. NEW 400 knoop hard gold over nickel.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

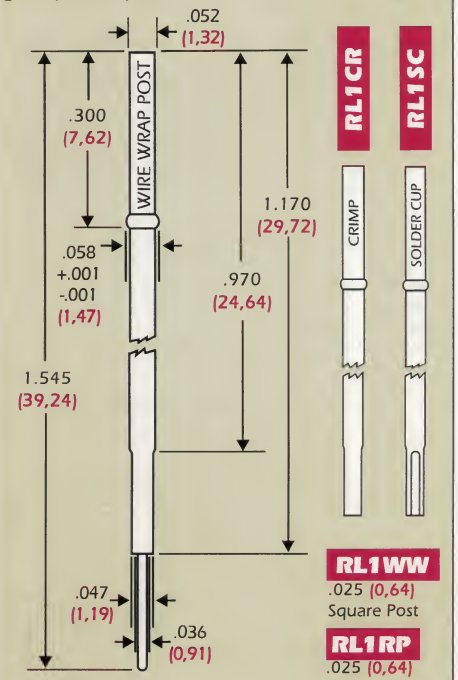
ICT → higher tolerance on contact resistance

FLUXBUSTERS™ FOR NO-CLEAN TESTING

Designed Specifically for In-Circuit Test

RECEPTACLE ICT-075

Connections:
Style WW: Wire Wrap .375 (9,53) post length standard, other lengths available
Style RP: Round Post .375 (9,53) post length
Style CR: Crimp
Style SC: Solder Cup
Recommended Crimped Wire Size: 24-28 GA
Material: Nickel/silver, gold plated, gold plated post



Drill Size: 1,45mm
Mounting Hole Size: .055/.057 (1,40/1,45)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

ACTUAL SIZE

Double Ended Receptacle
See page 55 R-75-DE

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
5.0 (142)	2.0 (57)
7.0 (198)	2.9 (82)
10.0 (283)	3.3 (94)

Additional forces and materials available, consult factory.

BECU PLUNGERS

ICT-075H	.048 (1,22)	
ICT-075T	.048 (1,22)	60°
ICT-075TX	.046 (1,17)	60°
ICT-075U	.025 (0,64)	60°

STEEL PLUNGERS

ICT-075NT	.048 (1,22)	
ICT-075S	.025 (0,64)	
ICT-075SP	.025 (0,64)	10°
ICT-075SW	.025 (0,64)	
ICT-075U	.025 (0,64)	
ICT-075UR	.018 (0,46) .025 (0,64)	
ICT-075VT	.048 (1,22)	60°
ICT-075Y	.048 (1,22)	

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.075 (1,91)
Current Rating—3 amps continuous
Spring Force—5.0, 7.0 or 10.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 11 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—G2
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper or steel. NEW 400 knoop hard gold over nickel.

HOW TO ORDER

ICT	075	T	5.0	G	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTION

SERIES
New G2 Barrel proprietary material and plating processes

SIZE

TIP STYLE

SPRING FORCE
5.0—5.0 oz. @ .170 (4,32) travel
7.0—7.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel

PLATING OPTIONS
G—400 knoop hard gold

STEEL PLUNGER OPTION

CRIMPING PLIERS—CPRL1
INSERTION TOOL—RTRL1

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

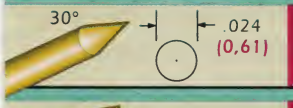
SERIES ICT™ — SIZE 50J — .050 CENTERS

BECU PLUNGERS

ICT-50JA

ICT-50JJ

STEEL PLUNGERS

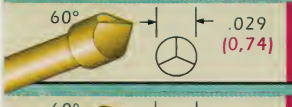


ICT-50JB

ICT-50JHS

ICT-50JSP

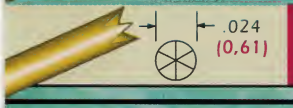
ICT-50JSW



ICT-50JT

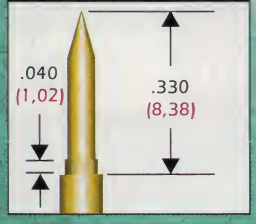
ICT-50JTL

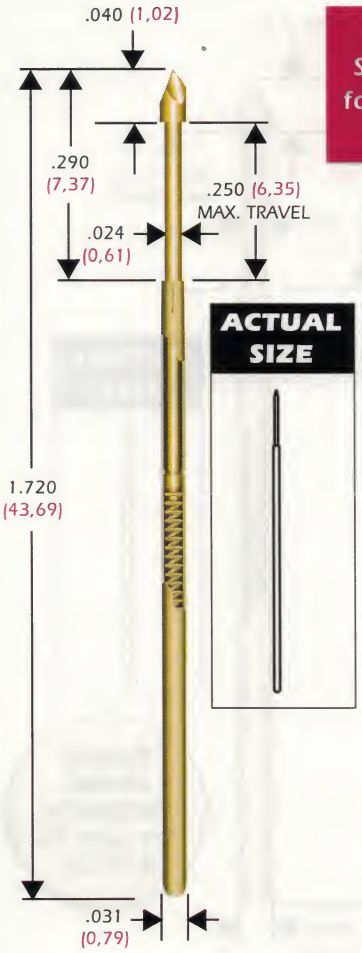
ICT-50JUR



ICT-50JZ

Probe Extension from Receptacle





ACTUAL SIZE

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.7 (105)	2.1 (59)
5.5 (156)	3.0 (85)
7.0 (199)	2.6 (74)
10.0 (284)	2.8 (80)

Additional forces and materials available, consult factory.

Designed Specifically for In-Circuit Test

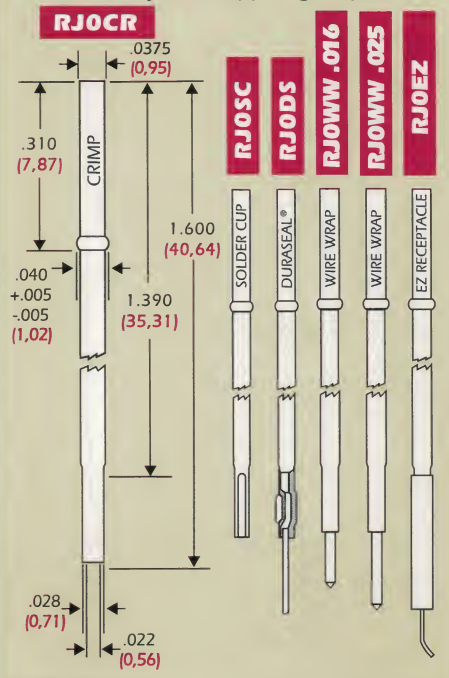
IDI FLUXBUSTERS® FOR NO-CLEAN TESTING

RECEPTACLE ICT 50J

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style DS: DuraSeal, vacuum sealed
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style EZ: Wire plug 30 GA

Recommended Crimped Wire Size:
28-30 GA

Material: Beryllium copper, gold plated



Drill Size: #61
Mounting Hole Size: .0385/.0390 (0,98/0,99)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

ICT	50J	B	7.0	G	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTION

3.7—3.7 oz. @ .170 (4,32) travel
5.5—5.5 oz. @ .170 (4,32) travel
7.0—7.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel

G—400 knoop hard gold

CRIMPING PLIERS—CPRJ0
INSERTION TOOL—RTRJ0

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—3.7, 5.5, 7.0 or 10.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 17 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—G2
Spring—Stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper or steel. NEW 400 knoop hard gold over nickel.

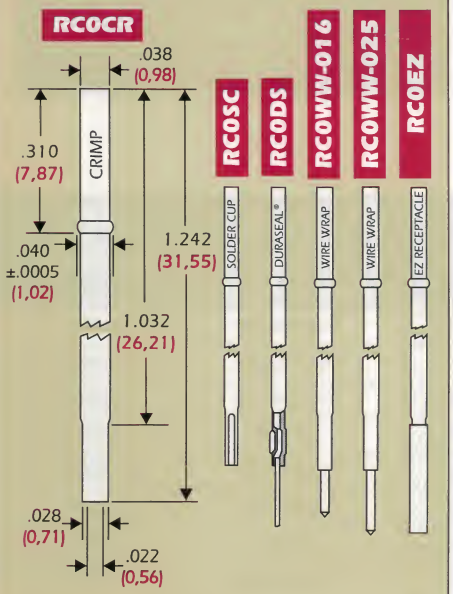
FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

FLUXBUSTERS™ FOR NO-CLEAN TESTING

Designed Specifically for In-Circuit Test

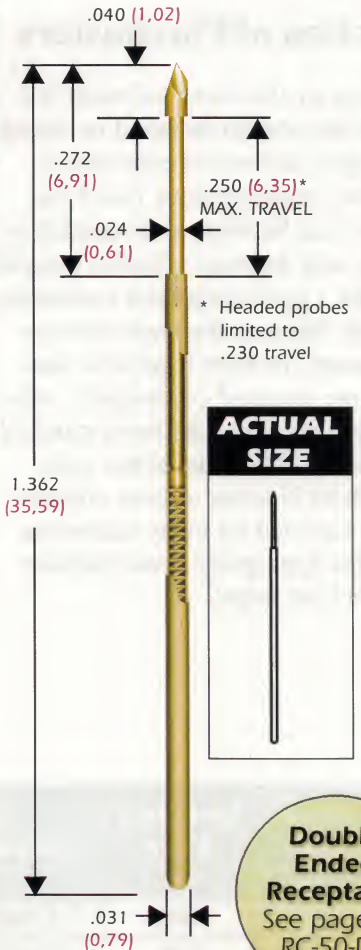
RECEPTACLE ICT-50C

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style DS: DuraSeal, vacuum sealed
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style EZ: Wire plug, 30 GA
Recommended Crimped Wire Size:
28-30 GA
Material: Beryllium copper, gold plated



Drill Size: #61
Mounting Hole Size: .0385/.0390 (0,98/0,99)

Specifications subject to change without notice.
Dimensions in inches (millimeters)



* Headed probes limited to .230 travel

ACTUAL SIZE

Double Ended Receptacle
See page 55 RC-50-DE

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.2 (91)	2.0 (57)
5.4 (153)	2.0 (57)

Additional forces and materials available, consult factory.

BECU PLUNGERS

ICT-50CA	.035 (0,89), 90°
ICT-50CJ	.024 (0,61)

STEEL PLUNGERS

ICT-50CB	.024 (0,61), 30°
ICT-50CHS	.024 (0,61)
ICT-50CSP	.024 (0,61), 20°
ICT-50CSW	.024 (0,61)
ICT-50CT	.029 (0,74), 60°
ICT-50CTL	.035 (0,89), 60°
ICT-50CUR	.011 (0,28), .024 (0,61)
ICT-50CZ	.024 (0,61)

Probe Extension from Receptacle

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—3.2 or 5.4 oz. @ .170 (4,32) travel
Contact Resistance—Less than 17 milliohms
Recommended Working Travel—.170 (4,32)

MATERIALS

Contact Barrel—G2
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper or steel. NEW 400 knoop hard gold over nickel.

HOW TO ORDER

ICT	50C	B	5.4	DG	S
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS	STEEL PLUNGER OPTION
			3.2—3.2 oz. @ .170 (4,32) travel **5.4**—5.4 oz. @ .170 (4,32) travel	**G**—400 knoop hard gold	

CRIMPING PLIERS—CPRC0
INSERTION TOOL—RTRC0

View updates of this information at http://www.idinet.com

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

IDI No-Clean Probes.
The Most Aggressive Arsenal Available.

Ever since we declared war on no-clean environments with the introduction of our Fluxbuster™ Series in 1990, we have not found an environment that we could not overpower with our probes. IDI has a variety of options for any unfavorable test environment.

Our patented Rotator™ Probe is the most aggressive probe in the Fluxbuster Series. Designed to rotate up to 90° at the rated travel, this probe virtually drills through the contaminants on the PCB.

Our exhaustive line of steel plungers and high spring force options are available on 50, 75 and 100 mil centers — all with up to 10 oz. of spring force.

Call us and let us address your no-clean application with our multiple options.

Selection of Fluxbusters

Choosing an effective Fluxbuster is a process that should be based on factual information and others experiences. Some test engineers have found that progress can be made most quickly by starting with the most effective possible probe for a given target and contamination type. Because the most effective Fluxbusters are more expensive than their more standard counterparts, other test engineers start with more standard probe styles. The chart below rates Fluxbusters in terms of their effectiveness as reported by many customers, versus the appropriate contamination level, and test target.

Series	Leads	Pads	Filled Vias	Unfilled Vias	Flux Residue	Conformal Coatings and Solder Masks	OSP Coatings
Rotators	N/A	10	9	N/A	Excellent	Excellent	Excellent
Tri-Needle (TN)	10	7	3	N/A	Excellent	Excellent	Superior
Single Needle (SN)	N/A	8	6	N/A	Excellent	Excellent	Superior
Needle Teeth (NT)	7	9	2	1	Excellent	Good	Good
Chiseled Spear (SP/SPB)	N/A	9	7	7	Excellent	Superior	Excellent
Arrowhead Spear (SW)	N/A	9	8	8	Excellent	Superior	Good
Tapered Crown (UST/UR)	N/A	8	8	8	Superior	Good	Good
Steel Plungers with high spring forces	6	6	6	5	Superior	Superior	Good
BeCu Plungers with high spring forces	3	3	3	3	Good	Fair	Good

* Rated from 0 to 10, with 10 being optimal

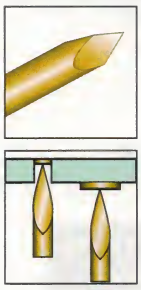
Recommended Fluxbusting Tip Styles

IDI offers a multitude of fluxbusting probe options for test engineers seeking solutions to their challenging No Clean or OSP test environments. With such a wide offering, the probe selection process can be daunting. A general guide to the most popular and effective tips is offered here.

If the PCB production process parameters are well understood, the probe selection process may be routine. On the contrary, if the production process and resulting effect on board test presents a challenge, the test engineer must exercise diligence in probe selection to ensure good results.

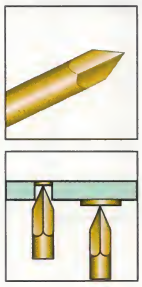
The most important aspect of probe selection is tip style consideration. Unique tip geometries offer benefits specific to particular testing requirements. Several unique tip styles are described here as a preliminary guide to probe selection. This guide is not an exhaustive treatment and as always, the specifics of the test environment should guide the test engineer in probe selection. IDI can offer more extensive information and advice. Please call with your questions and concerns.

SP, SPB (Sharp 3-Sided Chisel):



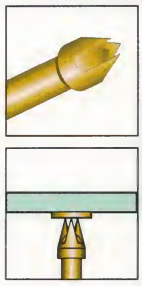
One of most successful tip designs. Aggressive sharp tip breaks through flux and contamination on pads. Excellent choice for OSP because the tip is very mechanically stable when breaking through very hard OSP surface. Also very effective on filled, partially filled, and unfilled vias. Sharp edges contact the sides of vias, cutting thru flux or OSP. The sharp tip penetrates filled or partially filled vias. Available in all ICT Series probes, pages 44-48.

SW (4-Sided Arrow):



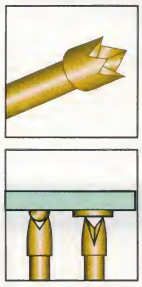
A unique geometry that is non-symmetric and provides more material at the tip. The wider angle helps prevent sticking in unfilled vias while the four edges bite into unfilled and partially filled vias. The sharp tip penetrates flux and contamination on pads and filled vias. Available in every ICT Series probe, pages 44-48.

NT (Needle Teeth):



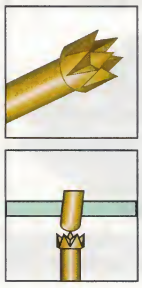
Perhaps the best solution for bowed pads. The three needles offer sharp points to grab pads with a shape that would otherwise deflect a single point. Available in Size 25 (page 34), Size SL1 probes (page 28), ICT-100 (page 44) and ICT-075 (page 45).

WO (4 Point Crown):



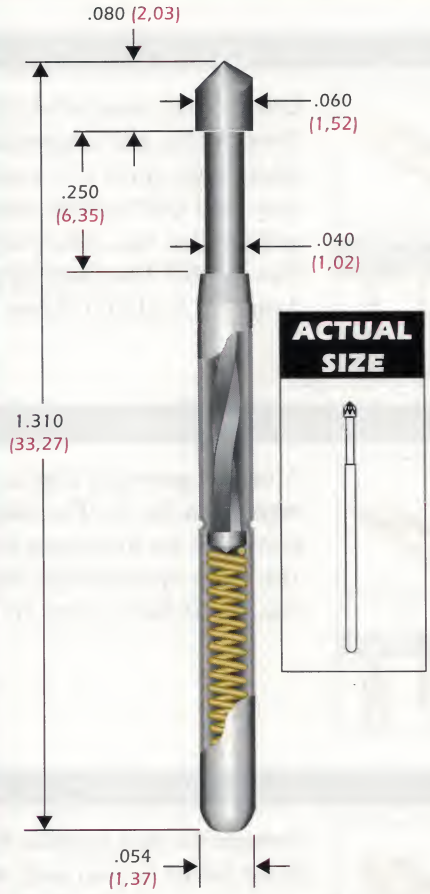
Four points ensure an excellent contact with pads, spreading the spring force over more contact than a single point. The non-self-cleaning design is more stable on mis-aligned leads and connector terminals. Sharp interior edges cut thru flux and contamination on leads. Available in Size 25 (page 34) and ICT-100 (page 44) probes.

Y (Tulip):



The most aggressive tip for mis-aligned, bent, or varying length leads. Multiple points on the diameter in combination with a center point guarantee contact with irregular leads while the inside edges trap the leads. The tip is self-cleaning to slough off flux and contamination. Available in Size 25 (page 34), Size SR-25 (page 36), ICT-100 (page 44) and ICT-075 (page 45).

SIZE 25 ROTATOR™ .100 CENTERS



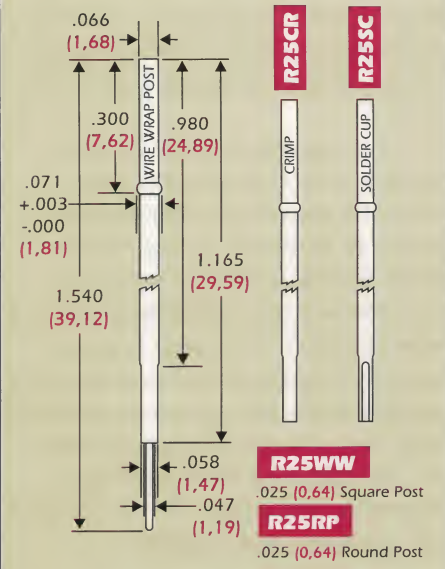
SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
4.0 (113)	1.7 (48)
5.5 (156)	1.6 (45)
6.7 (190)	3.4 (97)
8.0 (227)	2.8 (80)
10.0 (284)	1.8 (51)

Additional forces and materials available, consult factory.

FLUXBUSTERS® FOR NO-CLEAN TESTING

RECEPTACLE SIZE 25

Connection:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post
Style CR: Crimp
Style SC: Solder Cup
Recommended Crimped Wire Size: 22-26 GA
Material: Nickel/silver, gold plated, Gold plated post



Drill Size: #50
Mounting Hole Size: .068/.070 (1,73/1,78)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

SX	25	T	4.0	RT
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

4.0—4.0 oz. @ .170 (4,32) travel
5.5—5.5 oz. @ .170 (4,32) travel
6.7—6.7 oz. @ .170 (4,32) travel
8.0—8.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel

RT—Rotator: Duralloy™ Plated Plunger, DuraGold® Barrel

View updates of this information at http://www.idinet.com

CRIMPING PLIERS—CP25
INSERTION TOOL—RT25

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Spring Force—4.0, 5.5, 6.7, 8.0 or 10.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 25 milliohms
Maximum Travel—.220 (5,59)
Recommended Working Travel—.170 (4,32)
Rotates—90° @ .170 (4,32) travel

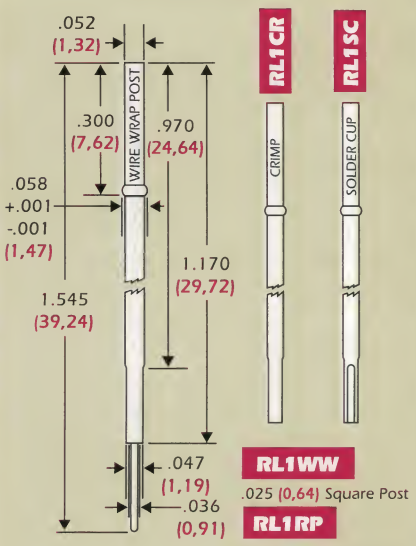
MATERIALS

Contact Barrel—DuraGold®
Spring—Music wire, precious metal plated (Stainless steel available in 4.0 and 6.7 oz.)
Plunger—Full-hard beryllium copper, Duralloy™

FLUXBUSTERS™ FOR NO-CLEAN TESTING

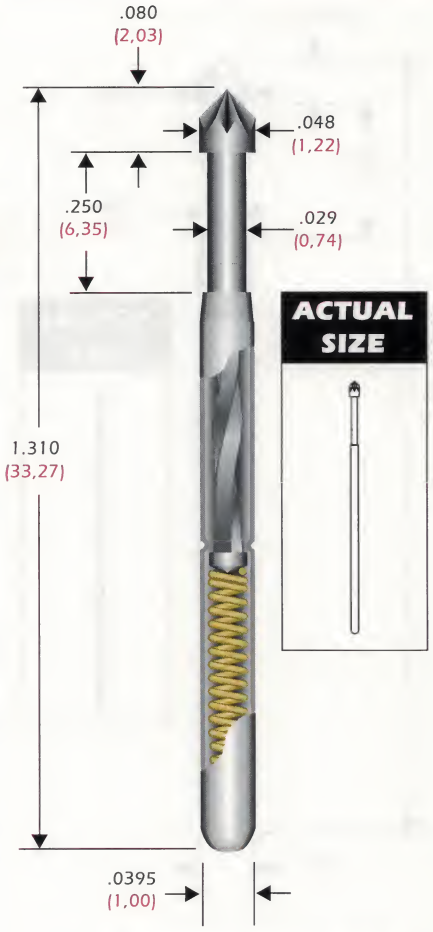
RECEPTACLE SIZE RL1

Connections:
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style RP: Round Post
Style CR: Crimp
Style SC: Solder Cup
Recommended Crimped Wire Size: 24-28 GA
Material: Nickel/silver, gold plated, Gold plated post



Drill Size: 1,45mm
Mounting Hole Size: .055/.057 (1,40/1,45)

Specifications subject to change without notice.
Dimensions in inches (millimeters)



SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.8 (108)	0.5 (14)
6.6 (187)	1.6 (45)

Additional forces and materials available, consult factory.

SXL1LM

ROTATOR OPTION™ — ROTATES 90° @ .170 (4,32) TRAVEL

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.075 (1,91)
Current Rating—3 amps continuous
Spring Force—3.8 or 6.6 oz. @ .170 (4,32) travel
Contact Resistance —Less than 25 milliohms
Maximum Travel—.225 (5,72)
Recommended Working Travel—.170 (4,32)
Rotates—90° @ .170 (4,32) travel

MATERIALS

Contact Barrel—DuraGold®
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, Duralloy™

HOW TO ORDER

SXL	1	LM	3.8	RT
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

3.8—3.8 oz. @ .170 (4,32) travel
6.6—6.6 oz. @ .170 (4,32) travel

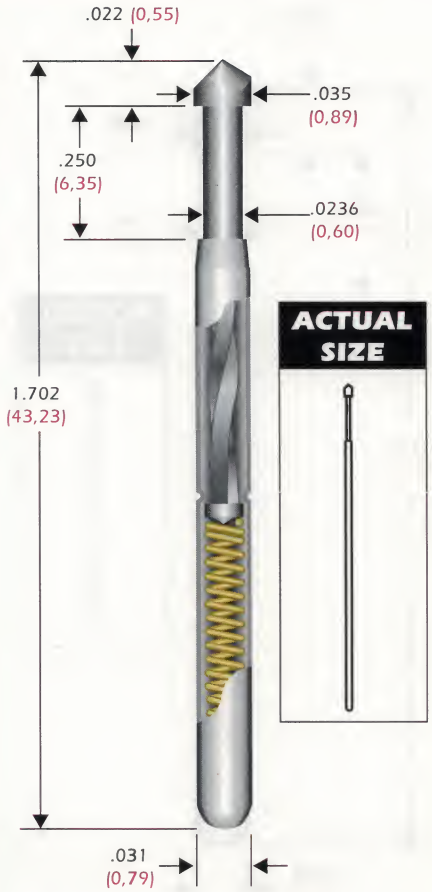
RT— Rotator: Duralloy™ Plated Plunger, DuraGold® Barrel

CRIMPING PLIERS—CPRL1
INSERTION TOOL—RTRL1

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

SIZE 0 ROTATOR™ .050 CENTERS



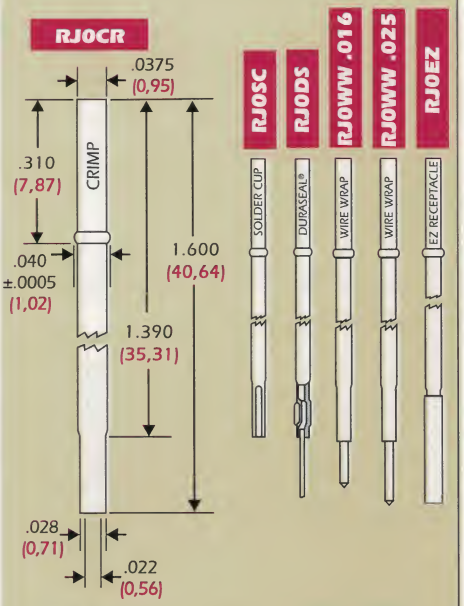
SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.6 (102)	2.0 (57)
5.5 (156)	2.9 (82)
7.0 (199)	2.6 (74)
10.0 (284)	2.6 (74)

Additional forces and materials available, consult factory.

FLUXBUSTERS™ FOR NO-CLEAN TESTING

RECEPTACLE SIZE RJ0

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style DS: DuraSeal, vacuum sealed
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style EZ: Wire plug, 30 GA
Recommended Crimped Wire Size:
28-30 GA
Material: Beryllium copper, gold plated



Drill Size: #61
Mounting Hole Size: .0385/.0390 (0,98/0,99)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

HOW TO ORDER

SJ	0	TL	3.6	RT
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

SPRING FORCE
3.6—3.6 oz. @ .170 (4,32) travel
5.5—5.5 oz. @ .170 (4,32) travel
7.0—7.0 oz. @ .170 (4,32) travel
10.0—10.0 oz. @ .170 (4,32) travel

PLATING OPTIONS
RT—Rotator: Duralloy™ Plated Plunger, DuraGold® Barrel

CRIMPING TOOL—CPSJO
INSERTION TOOL—RTRJ0

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—3.6, 5.5, 7.0 or 10.0 oz. @ .170 (4,32) travel
Contact Resistance—Less than 17 milliohms
Maximum Travel—.250 (6,35)
Recommended Working Travel—.170 (4,32)
Rotates—85° @ .170 (4,32) travel

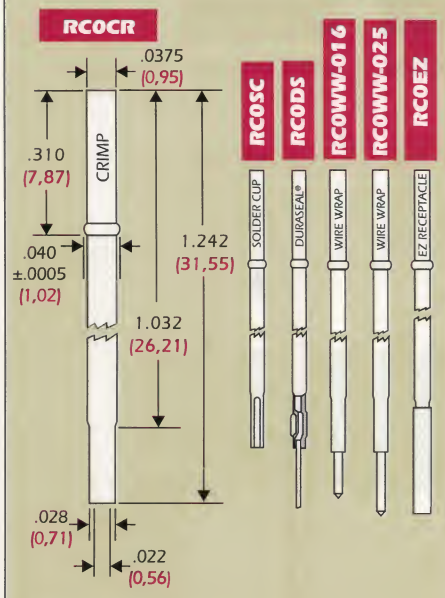
MATERIALS

Contact Barrel—DuraGold®
Spring—Stainless steel or music wire, gold plated
Plunger—Full-hard beryllium copper, Duralloy™

FLUXBUSTERS™ FOR NO-CLEAN TESTING

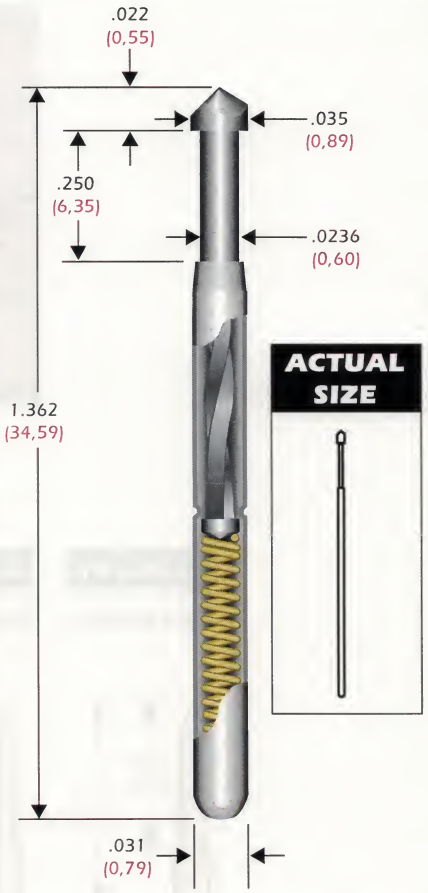
RECEPTACLE SIZE RC0

Connections:
Style CR: Crimp
Style SC: Solder Cup
Style DS: DuraSeal, vacuum sealed
Style WW-016: Wire wrap .016 (0,41) square post
Style WW-025: Wire wrap .025 (0,64) square post
Style EZ: Wire plug, 30 GA
Recommended Crimped Wire Size:
28-30 GA
Material: Beryllium copper, gold plated



Drill Size: #61
Mounting Hole Size: .0385/.0390 (0,98/0,99)

Specifications subject to change without notice.
Dimensions in inches (millimeters)



ACTUAL SIZE

SPRING FORCE @ .170 (4,32) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.7 (105)	1.5 (42)

Additional forces and materials available, consult factory.

SCOTL

ROTATOR OPTION™ — ROTATES 85° @ .170 (4,32) TRAVEL

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Spring Force—3.7 oz. (105) @ .170 (4,32) travel
Maximum Travel—.250 (6,35)
Recommended Working Travel—.170 (4,32)
Rotates—85° @ .170 (4,32) travel

MATERIALS

Contact Barrel—DuraGold®
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, Duralloy™

HOW TO ORDER

SC	0	TL	3.7	RT
SERIES	SIZE	TIP STYLE	SPRING FORCE	PLATING OPTIONS

3.7—3.7 oz. @ .170 (4,32) travel

RT—Rotator: Duralloy™ Plated Plunger, DuraGold® Barrel

CRIMPING TOOL—CPSCO
INSERTION TOOL—RTRC0

RECEPTACLE HOW TO ORDER— The bars in the receptacle box give you the part number to order.

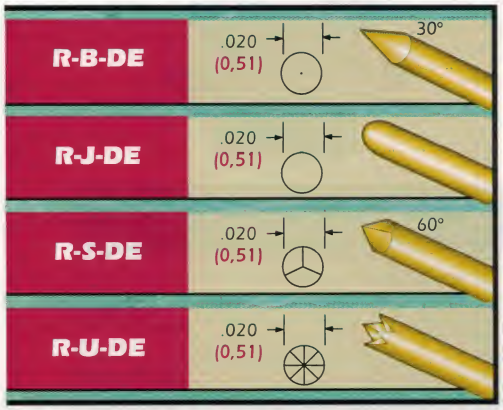
View updates of this information at http://www.idinet.com

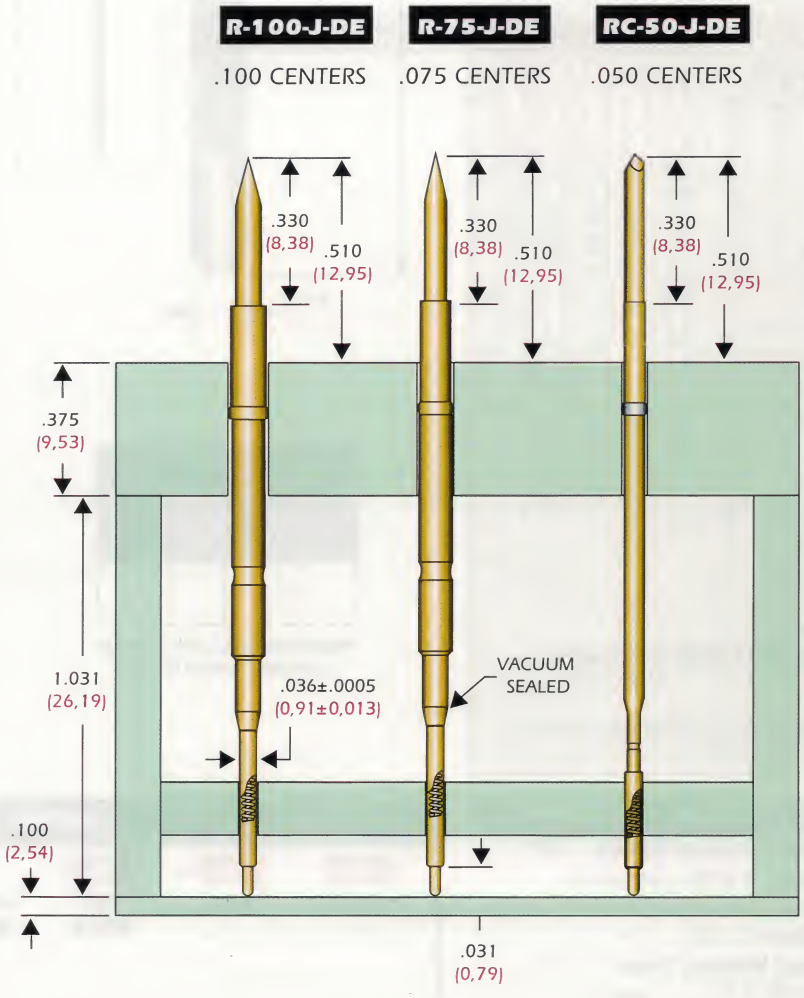
IDI Wireless Probes. Improved Mechanical Integrity and Strength.

For high speed applications, IDI double ended probes and receptacles offer you the most options for reducing circuit path and enhancing signal integrity. Now, only IDI offers you the strongest receptacles ever built. Thanks to a new, enhanced design, IDI double-ended receptacles provide the mechanical integrity you need to eliminate downtime.

The double ended receptacle has traditionally been a challenge for fixture designers because its long length results in greater fragility than standard receptacles. The special design and manufacturing requirements for wireless fixtures combined with the handling and installation procedures for double ended receptacles create an unfavorable overall cost picture for wireless fixtures.

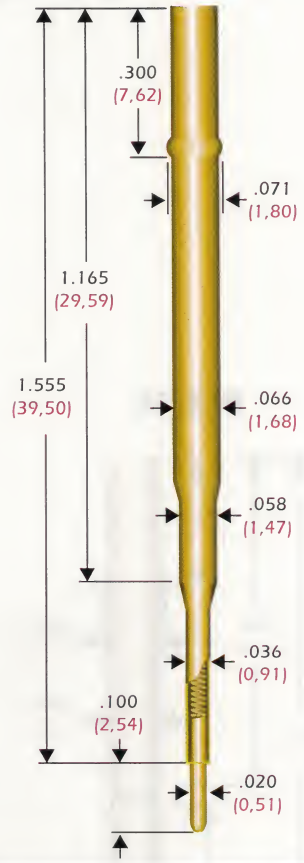
To alleviate any potential issues with receptacles, IDI has improved the design of our Double Ended Receptacles for Wireless Fixtures. Our engineering expertise in combination with custom designed manufacturing processes yields a stronger, more durable receptacle less subject to bending or breaking during the rigors handling and fixture assembly. The benefit is reduced overall fixture cost and more important, less downtime.





Double Ended Probes and Receptacles

R-100-J-DE



PROBE TECHNICAL SUMMARY

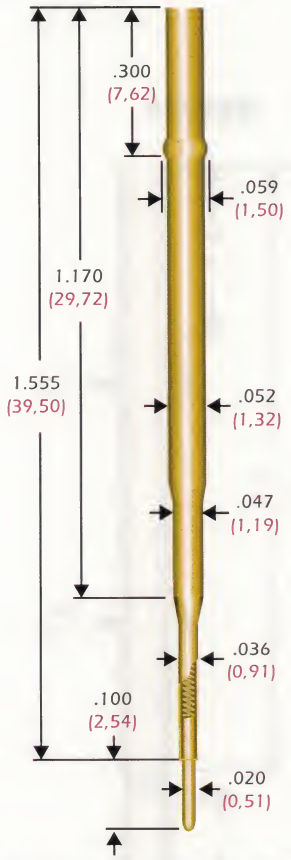
Recommended Minimum Centers—.100 (2,54)
Recommended Drill Size—#50
Recommended Mounting Hole—.068/.070 (1,73/1,78)
Spring Force—2.7 oz. (77g) @ .069 (1,75) travel

MATERIALS

Receptacle—Nickel/silver, gold plated
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel

R-100-DE: Uses Size 25 probe, see page 34 and ICT-100 probe, see page 44.

R-75-J-DE



PROBE TECHNICAL SUMMARY

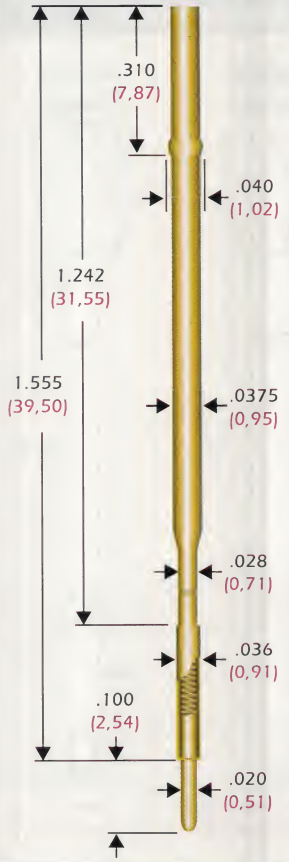
Recommended Minimum Centers—.075 (1,91)
Recommended Drill Size—1,45mm
Recommended Mounting Hole—.055/.057 (1,40/1,45)
Spring Force—2.7 oz. (77g) @ .069 (1,75) travel

MATERIALS

Receptacle—Nickel/silver, gold plated
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel

R-75-DE: Uses size SL1 spring contact probe, see page 28; ICT-075, see page 45.

RC-50-J-DE



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Recommended Drill Size—#61
Recommended Mounting Hole—.0385/.0390 (0,98/0,99)
Spring Force—3.4 oz. (97g) @ .069 (1,75) travel

MATERIALS

Receptacle—Beryllium copper, gold plated
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel

RC-50-DE: Uses size SC0 probe, see page 24; ICT-50C see page 47.

HOW TO ORDER

R	100	J	DE
SERIES	SIZE	TIP STYLE	DOUBLE ENDED RECEPTACLE

Double Ended Probes & Receptacles Test Fixturing Information
See Sourcebook page 90

View updates of this information at http://www.idinet.com

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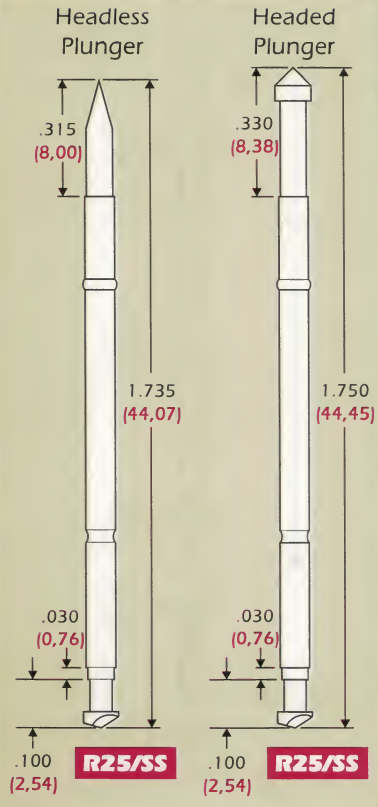
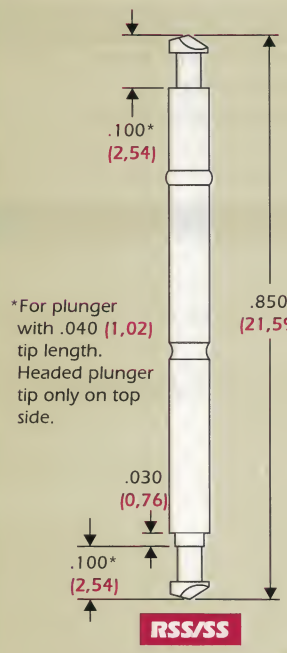
Double Ended Receptacles

.100 Centers

ASSEMBLED DIMENSIONS

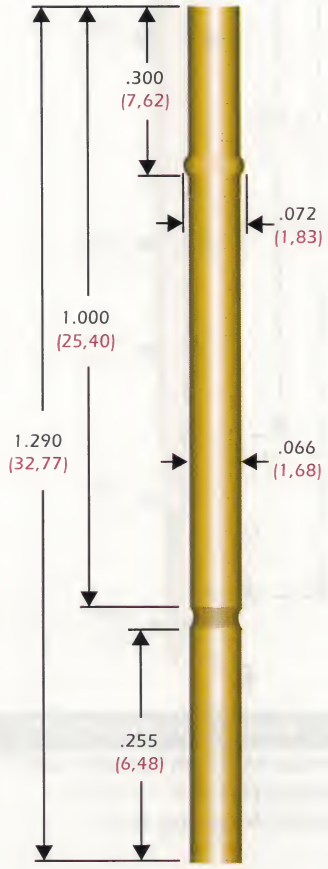




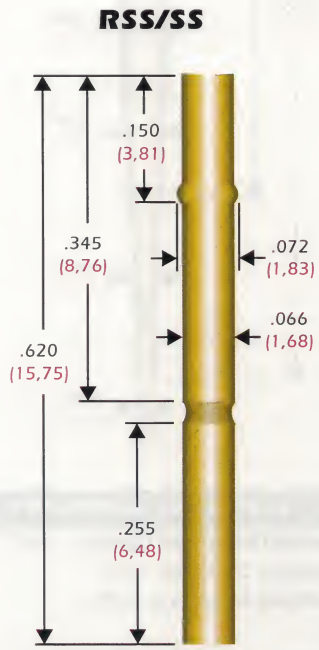
*For plunger with .040 (1,02) tip length. Headed plunger tip only on top side.

Specifications subject to change without notice.
Dimensions in inches (millimeters)

R25/SS



RSS/SS



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Recommended Drill Size—#50
Recommended Mounting Hole—.068/.070 (1,73/1,78)

MATERIALS

Economy Series—Nickel/silver, unplated
Standard Series—Nickel/silver, gold plated over nickel

This receptacle houses a size 25 (page 34) or ICT-100 (page 44) on the top end and an SS100 or GSS100 (pages 30-31) on the bottom end.

HOW TO ORDER

Economy Series—RE-25/SS (unplated)
Standard Series—R-25/SS (gold plated)

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Recommended Drill Size—#50
Recommended Mounting Hole—.068/.070 (1,73/1,78)

MATERIALS

Economy Series—Nickel/silver, unplated
Standard Series—Nickel/silver, gold plated over nickel

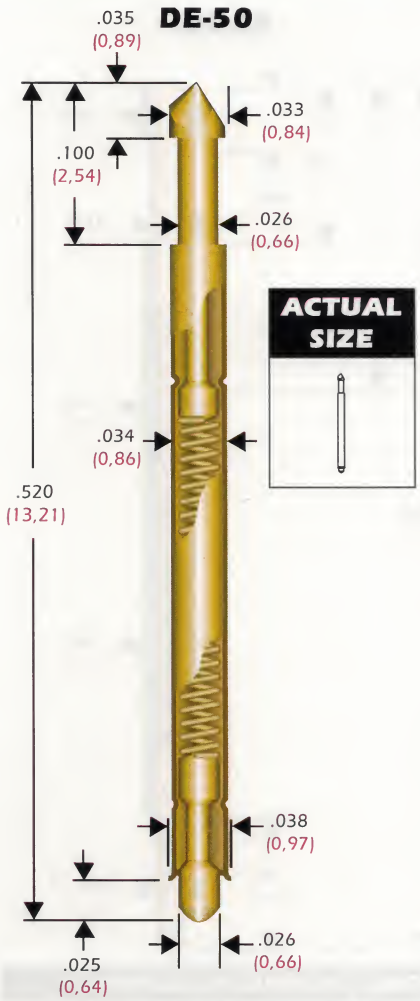
This receptacle houses an SS100 or GSS100 (pages 30-31) on each end.

HOW TO ORDER

Economy Series—RE-SS/SS (unplated)
Standard Series—R-SS/SS (gold plated)

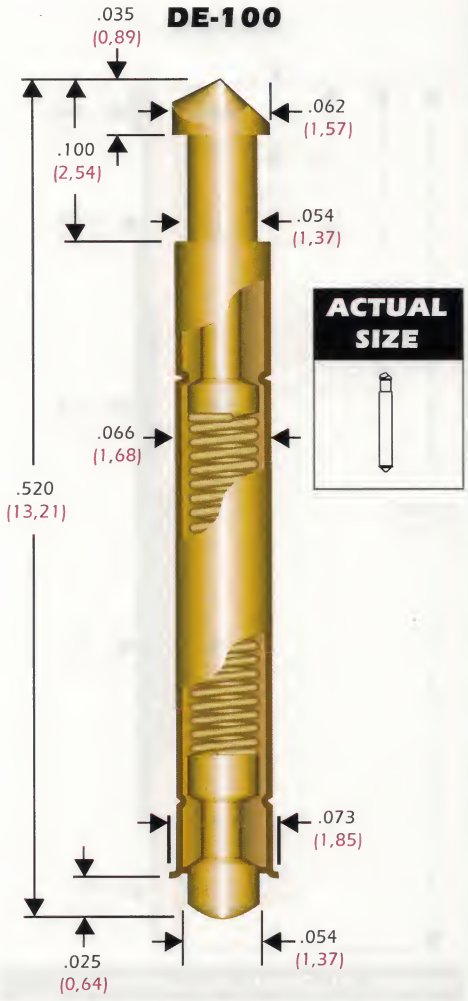
DOUBLE ENDED PROBES

DE-50



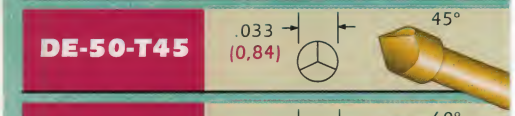
SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
2.0 (57)	0.8 (23)

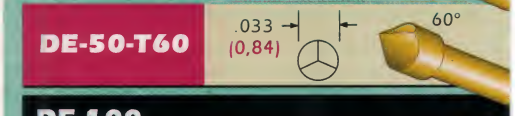
DE-100



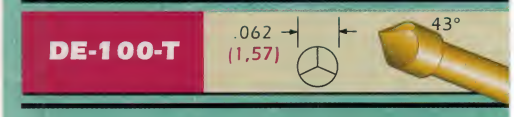
SPRING FORCE @ .050 (1,27) TRAVEL oz. (gm)	PRELOAD SPRING FORCE oz. (gm)
3.0 (85)	1.3 (37)

DE-50





DE-100



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—
DE-50: .050 (1,27)
DE-100: .100 (2,54)
Recommended Drill Size—
DE-50: #64—.0350/.0365 (0,89/0,93)
DE-100: 1,75mm—.067/.069 (1,70/1,75)
Current Rating—3 amps continuous
Spring Force—
DE-50: 2.0 oz. @ .050 (1,27) travel
DE-100: 3.0 oz. @ .050 (1,27) travel
Maximum Travel—.080 (2,03)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel
Contact—Full-hard beryllium copper, gold plated over nickel
Spring—Music wire, gold plated

HOW TO ORDER

DE	100	T	3.0	G
SERIES	SIZE **50**—.050 (1,27) centers **100**—.100 (2,54) centers	TIP STYLE	SPRING FORCE **DE50:** **2.0**—2.0 oz. @ .050 (1,27) travel **DE100:** **3.0**—3.0 oz. @ .050 (1,27) travel	PLATING OPTIONS **G**—Gold

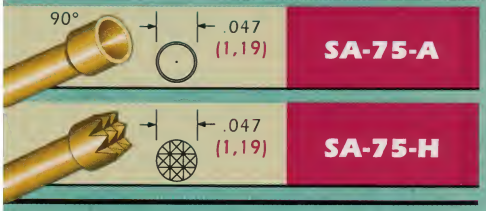
View updates of this information at http://www.idinet.com

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

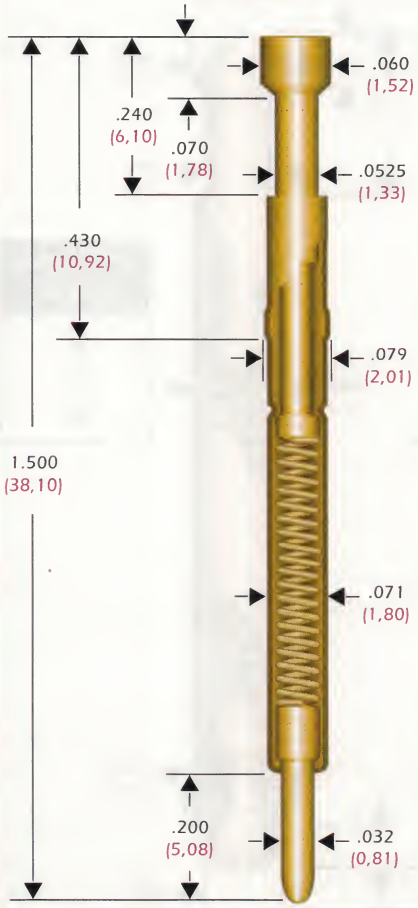
CASSETTE PROBES FOR ATG SYSTEMS

SA-100 PLUNGER OPTIONS

SA-75 PLUNGER OPTIONS



SA-100



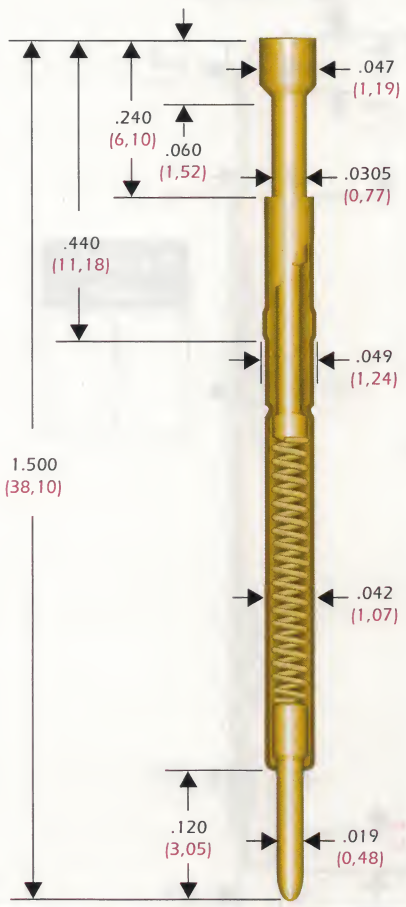
PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Recommended Minimum Travel—.170 (4,32)
Spring Force—5.5 oz. @ .170 (4,32) travel
Maximum Travel—.240 (6,10)

MATERIALS

Contact Barrel—
Economy: Nickel/silver, hard silver plated
Standard: Nickel/silver, gold plated
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated
Contact—Full-hard beryllium copper, gold plated

SA-75



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.075 (1,91)
Current Rating—3 amps continuous
Recommended Minimum Travel—.200 (5,08)
Spring Force—5.5 oz. @ .200 (5,08) travel
Maximum Travel—.300 (7,62)

MATERIALS

Contact Barrel—
Economy: Nickel/silver
Standard—Nickel/silver, gold plated
Spring—Music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated
Contact—Full-hard beryllium copper, gold plated

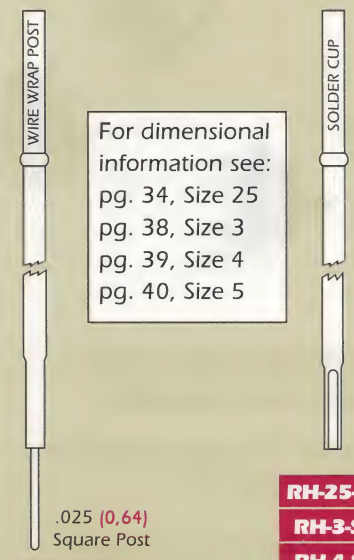
HOW TO ORDER

SA	100	A	5.5	S
SERIES	SIZE 100 or 75	TIP STYLE	SPRING FORCE **SA-100** **5.5**—5.5 oz. @ .170 (4,32) travel **SA-75:** **5.5**—5.5 oz. @ .200 (5,08) travel	PLATING OPTIONS **S**—Standard **E**—Economy

View updates of this information at http://www.idinet.com

RH RECEPTACLES SERIES SH

Connections—
Style WW: Wire Wrapped .375 (9,53) post length standard, other lengths available
Style SC: Solder Cup
Material—High performance copper alloy, gold plated

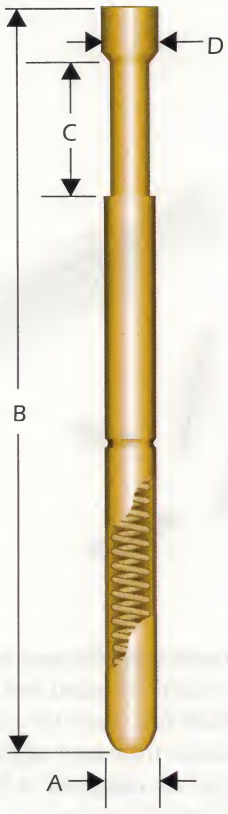


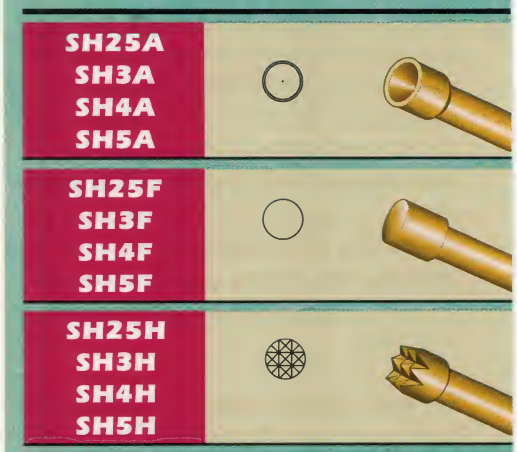
For dimensional information see:
pg. 34, Size 25
pg. 38, Size 3
pg. 39, Size 4
pg. 40, Size 5

RH-25-WW

RH-25-SC
RH-3-SC
RH-4-SC
RH-5-SC

Specifications subject to change without notice.
Dimensions in inches (millimeters)





DIM	SH-25	SH-3	SH-4	SH-5
A	.054 (1,37)	.080 (2,03)	.093 (2,36)	.125 (3,18)
B	1.310 (33,27)	1.310 (33,27)	1.330 (33,78)	1.420 (36,07)
C	.250 (6,35)	.250 (6,35)	.260 (6,60)	.250 (6,35)
D	.060* (1,52)	.100* (2,54)	.156* (3,96)	.156* (3,96)

* Tip diameters may vary.

PROBE TECHNICAL SUMMARY

Series	SH-25	SH-3	SH-4	SH-5
Recommended Minimum Centers	.100 (2,54)	.125 (3,18)	.156 (3,96)	.187 (4,75)
Spring Force	4.0 (114)	7.0 (199)	10.0 (284)	18.7 (531)
Recommended Working Travel	.170 (4,32)	.170 (4,32)	.170 (4,32)	.170 (4,32)

CURRENT CAPACITY

Series	SH-25	SH-3	SH-4	SH-5
Continuous Current Rating*	20	30	35	45
Temp Rise °F @ Rated Current	250	250	300	230

* Continuous current in amperes. Temperature rise ($\triangle T$) of a single probe, °F, as measured in ambient (70°F) air, free standing.

AMPERAGE PER GIVEN TEMP. RISE

Series/Rise	70°F	90°F	150°F
S25	11	13	18
S3	13	16	23
S4	14	17	25
S5	24	29	42

MATERIALS

Contact Barrel—High performance copper alloy, gold plated
Spring—Stainless steel
Ball—Stainless steel, gold plated
Plunger—Beryllium copper, gold plated

HOW TO ORDER

SH — **SERIES**

25 — **SIZE**
25—.100 (2,54) centers
3—.125 (3,18) centers
4—.156 (3,96) centers
5—.187 (4,75) centers

A — **TIP STYLE**

5.5 — **SPRING FORCE**
SIZE 25
4.0—4.0 oz. @ .170 (4,32) max. travel
6.7—6.7 oz. @ .170 (4,32) max. travel
SIZE 3
7.0—7.0 oz. @ .170 (4,32) max. travel
SIZE 4
10.0—10.0 oz. @ .170 (4,32) max. travel
SIZE 5
18.7—18.7 oz. @ .170 (4,32) max. travel

G — **PLATING OPTIONS**
G—Gold Plated Plunger

View updates of this information at http://www.idinet.com

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IDI Battery Contacts and Semiconductor Probes

Battery Contact and Interconnect Probes are designed to optimize contact performance in high-reliability, multiple cycle interconnect applications. Examples of typical applications include the connection between a mobile radio's PCB and its battery; a board-to-board interconnect for docking of a portable device to its programming station; or an interconnect between a camera body and a powered zoom lens.

For years, spring contact probes have been used to provide a high reliability compliant interconnect between test systems and printed circuit boards. The Battery Contact and Interconnect Probes are simply an evolution of that concept with a design suitable for use in consumer and portable electronic products.

Battery Contact and Interconnect Probe designs are optimized for direct mounting to printed circuit boards. They are typically extremely rugged and compact. Their electrical performance is maximized to provide a reliable path for either a power supply or signal path.

Battery Contact and Interconnect Probes have several advantages over stamped metal contacts. Most stamped metal contacts are cantilever beam designs. Cantilever contacts scrub the interconnect pad on the product, wearing platings rapidly and leading to contact failure. Spring contact probes feature linear compliance, providing reliable contact without a scrubbing action. Additionally, because the contact tip of the probe is screw machined, as opposed to the stamped surfaces of cantilever contacts, any imaginable tip profile can be incorporated in the probe. This allows the use of tips such as 4-point crowns, 9-point serrated crowns, and other high reliability contact designs, although a spherical radius is most often preferred.

The tendency of cantilever contacts to fatigue with use, gradually losing compliance force and eventually falling victim to contact failure, is not an issue with spring contact probes driven by reliable helical coil springs.

Cantilever beam contacts must necessarily use a large amount of board real estate relative to their size, since they derive their compliance from their angle. Spring contact probes are columnar in format and take up very little board space.

IDI probes simplify IC Device Testing

For many years, conventional wisdom has argued that spring contact probes did not make optimum test socket contact due to their long signal path length and high inductance.

Yet, with the lack of available standard test sockets for the wide range of new devices being introduced, test engineers have been forced to build their own sockets by borrowing a readily available technology: spring contact probes. Today, IDI spring probes are designed with specific test socket applications in mind and offer the advantages of great electrical performance, extremely long life and flexibility in design. IDI probes provide extremely linear and reliable contact force and electrical performance, even when used in temperatures from -50°C to 150°C. These attributes provide the test engineer with a reliable and cost effective solution that improves profitability.

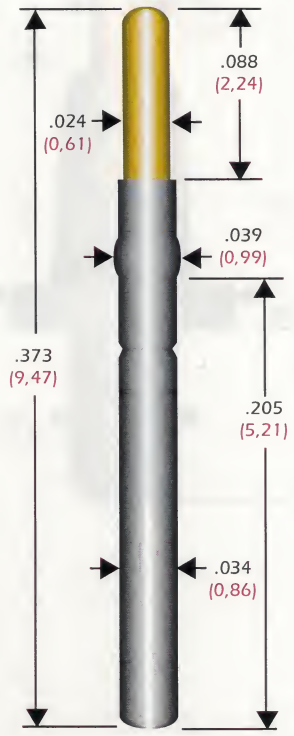
IDI probes provide socket designers these benefits:

- Long life. IDI probes can last more than a million cycles.
- Superior electrical performance. Test sockets using IDI probes are characterized with less than one nanohenry of self inductance.
- Experience, selection and customization. IDI brings you two decades of probe design and the industry's widest selection of probes specifically for socket usage. As the recognized innovator in probe technology, if we don't have a probe for your application, we'll design it.

Many of IDI's Battery Contact and Interconnect Probes have the following features:

- Current ratings as high as 7 amps
- Internal contact resistance as low as 10 milliohms
- Tape and reel packaging available for automated pick and place
- Long electromechanical life cycle—as many as 1,000,000 cycles
- Socket mounting—allowing easy field replacement

100803



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—1.3 oz. @ .050 (1,27) travel

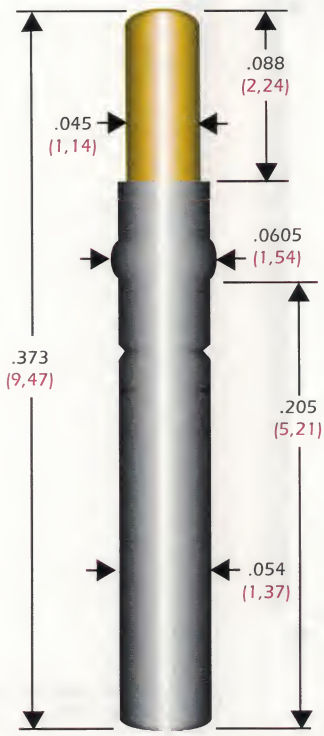
MATERIALS

Contact Barrel—Nickel/silver
Spring—Stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated
Special Features—Press ring

HOW TO ORDER

100803-00

100737



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—2.2 oz. @ .050 (1,27) travel

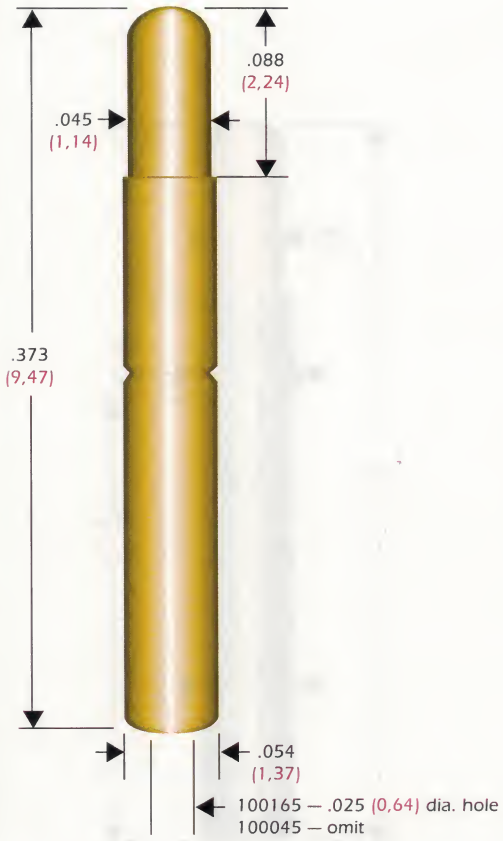
MATERIALS

Contact Barrel—Nickel/silver
Spring—Stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated
Special Features—Press ring

HOW TO ORDER

100737-01

100165
100045



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—3.8 oz. @ .050 (1,27) travel
7.0 oz @ .050 (1,27) travel

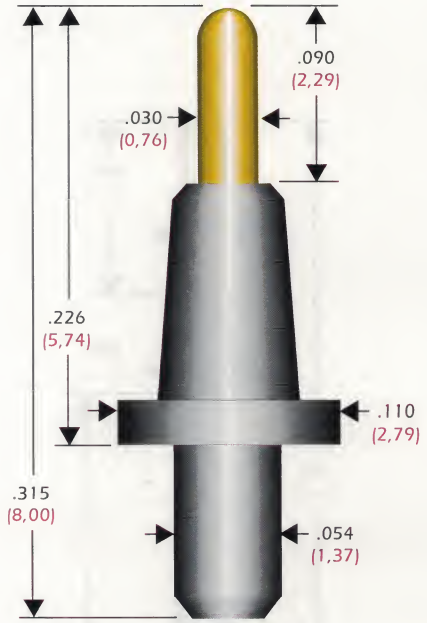
MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring— 3.8 oz.—Stainless steel, gold plated
7.0 oz.—Music wire, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel

HOW TO ORDER

100165-10-952 (for 3.8 0z. spring)
100165-21-952 (for 7.0 0z. spring)
100045-42-958 (for 3.8 0z. spring)
100045-44-958 (for 7.0 0z. spring)

100393



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.125 (3,18)
Current Rating—3 amps continuous
Recommended Working Travel—.060 (1,52)
Spring Force—3.1 oz. @ .060 (1,52) travel

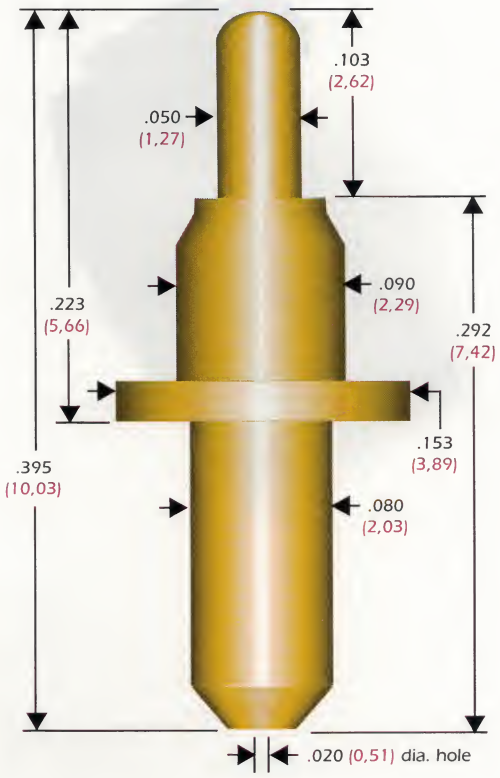
MATERIALS

Contact Barrel—Nickel/silver
Spring—Stainless steel
Plunger—Full-hard beryllium copper, gold plated over nickel
Special Features—Mounting Flange

HOW TO ORDER

100393-03

100410



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.200 (5,08)
Current Rating—3 amps continuous
Recommended Working Travel—.060 (1,52)
Spring Force—6.2 oz. @ .060 (1,52) travel

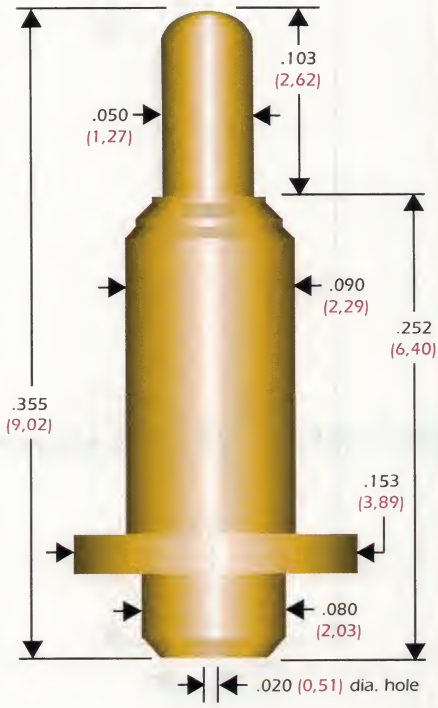
MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel
Plunger—Full-hard beryllium copper, gold plated over nickel
Bias Ball—Stainless steel, gold plated
Special Features—Mounting flange

HOW TO ORDER

100410-05

100891



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.200 (5,08)
Current Rating—3 amps continuous
Recommended Working Travel—.067 (1,70)
Spring Force—9.0 oz. @ .067 (1,70) travel

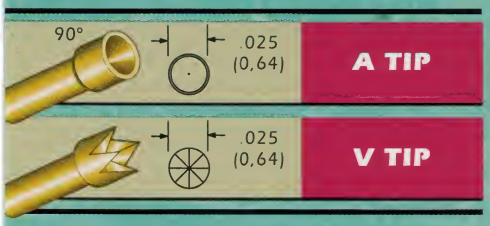
MATERIALS

Contact Barrel—Nickel/silver, gold plated
Spring—Stainless steel, gold plated
Plunger—Full-hard beryllium copper, gold plated over nickel
Special Features—Mounting flange

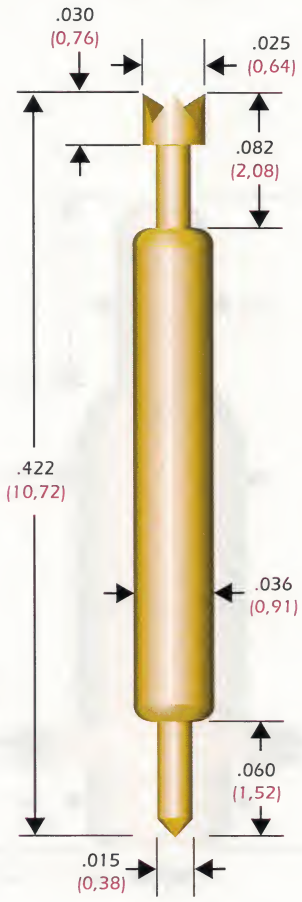
HOW TO ORDER

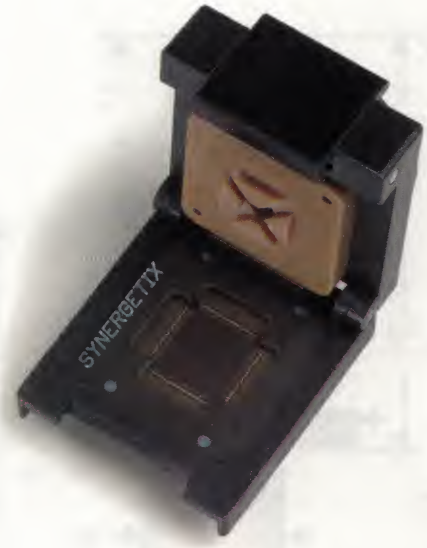
100891-02

NEW IDI PROBES



100785





PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.050 (1,27)
Contact Resistance—less than 50 milliohms
Current Rating—3 amps continuous
Recommended Working Travel—.090 (2,29)
Spring Force—1.5 oz. @ .090 (2,29) travel

MATERIALS

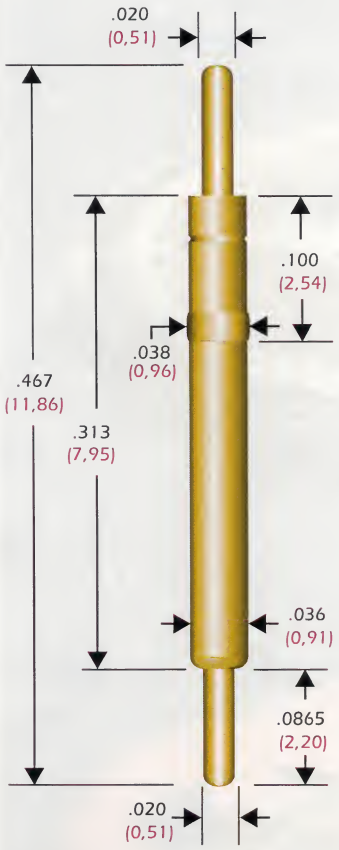
Contact Barrel—Beryllium copper, gold plated
Spring—Stainless steel, gold plated
Plungers—Beryllium copper, gold over nickel

HOW TO ORDER

100785-02 With V tip
100785-03 With A tip

NEW IDI PROBES

101009



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.039 (0,99)
Current Rating—3 amps continuous
Contact Resistance—less than 70 milliohms
Recommended Working Travel—.051 (1,30)
Spring Force—.8 oz. @ .067 (1,7) travel

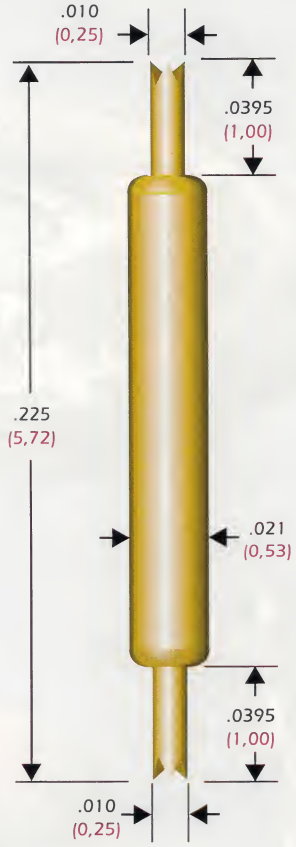
MATERIALS

Contact Barrel—Nickel silver, gold plated
Spring—Stainless steel, gold plated
Plungers—Beryllium copper, gold plated

HOW TO ORDER

101009-00

100938



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.025 (0,65)
Current Rating—3 amps continuous
Contact Resistance—less than 70 milliohms
Recommended Working Travel—.051 (1,30)
Spring Force—1.4 oz. @ .051 (1,30) travel

MATERIALS

Contact Barrel—Nickel silver, gold plated
Spring—Stainless steel, gold plated
Plungers—Beryllium copper, gold plated

HOW TO ORDER

100938-01

IDI Coax Probes.
Making True Coaxial Testing a Reality.

The IDI patented Coax Probe has a unique signal plunger continuously surrounded by a ground plane. This ground plane can be continued onto the Device Under Test (DUT) via a spring loaded shielding plunger. Because of this difference, the IDI Coax Probe maintains matched impedance and dielectric constant throughout. It allows interconnection with the least amount of signal deterioration while providing simple connect/disconnect features.

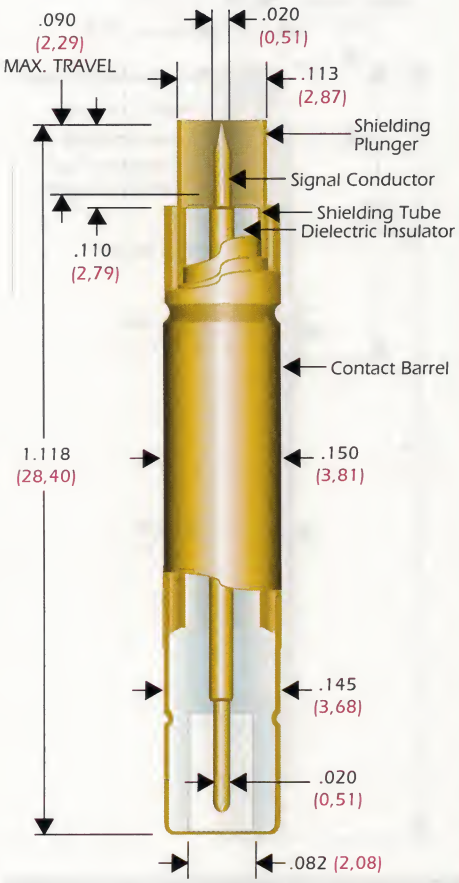
As a result, the Coax Probe has been used for signal frequencies as high as 3 GigaHertz. This compares to designs without the shielding plunger, which are typically rated to 500 MegaHertz.

IDI Coax Probes offer several termination options including pre-attached coaxial cable, true double-ended designs and direct attachment features.

Probes can also be used in Kelvin testing applications. The IDI design offers two signal paths on the same axis. The outer signal path may be used as a high current path and the signal conductor path can be used for voltage.

Shown on the next five pages are only a few of the Coax Probes manufactured by IDI. Additional Coaxial Probe designs are available in our special Coax Catalog.

Single Ended with Shielding Plunger SMB Connector



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.200 (5,08)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—
Signal Conductor: 1.3 oz. @ .050 travel
Shielding Plunger: 3.7 oz. @ .050 travel

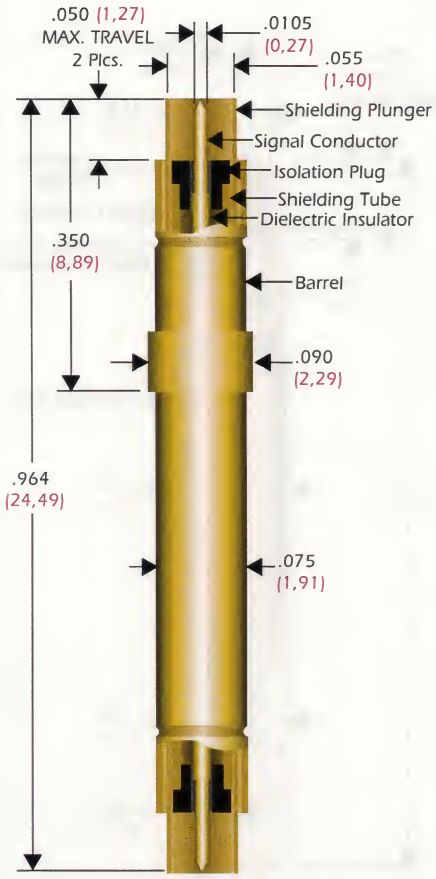
MATERIALS

Contact Barrel—Brass, gold plated
Springs—
Signal Conductor: Beryllium copper, gold plated
Shielding Plunger: Stainless steel, gold plated
Shielding Plunger—Beryllium copper, gold plated
Dielectric Insulator—Teflon
Shielding Tube—Stainless steel, gold plated
Signal Conductor—Series S, Size 00 probe with flanged barrel

HOW TO ORDER

100559-00

Double Ended with Shielding Plungers .100 Centers



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.100 (2,54)
Nominal Impedance—50 Ohms
Current Rating—0.5 amps continuous
Recommended Working Travel—.023 (0,58)
Spring Force—
Signal Conductor: 0.9 oz. @ .023 travel
Shielding Plunger: 2.2 oz. @ .023 travel
(each end)

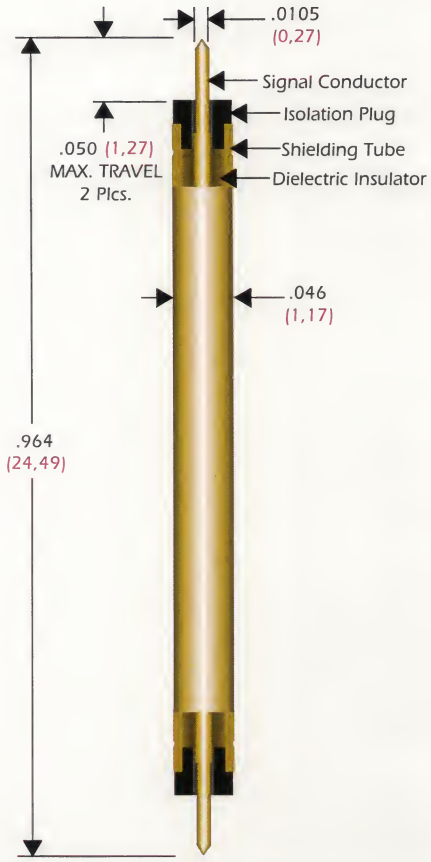
MATERIALS

Contact Barrel—Brass, gold plated
Springs—
Signal Conductor: Music Wire, gold plated
Shielding Plunger: Music Wire, gold plated
Shielding Plunger—Copper alloy, gold plated
Isolation Plug—Torlon
Dielectric Insulator—Air
Shielding Tube—Stainless steel, gold plated
Signal Conductor—Special Tri 0 probe

HOW TO ORDER

100546-00

Double Ended without Shielding Plungers .070 Centers



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.070 (1,78)
Nominal Impedance—50 Ohms
Current Rating—0.5 amps continuous
Recommended Working Travel—.023 (0,58)
Spring Force—
Signal Conductor: 0.9 oz. @ .023 travel
(each end)

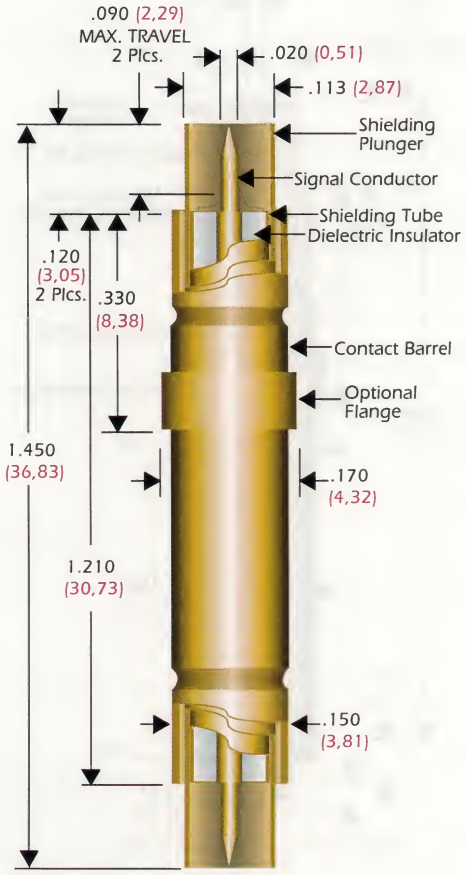
MATERIALS

Shielding Tube—Stainless steel, gold plated
Spring—Music wire, gold plated
Isolation Plug—Torlon
Dielectric Insulator—Air
Signal Conductor—Special Tri 0 probe

HOW TO ORDER

100547-00

Double Ended with Shielding Plungers



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.200 (5,08)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.070 (1,78)
Spring Force—
Signal Conductor:
1.6 oz. @ .070 travel (each end)
Shielding Plunger:
4.3 oz. @ .070 travel (each end)

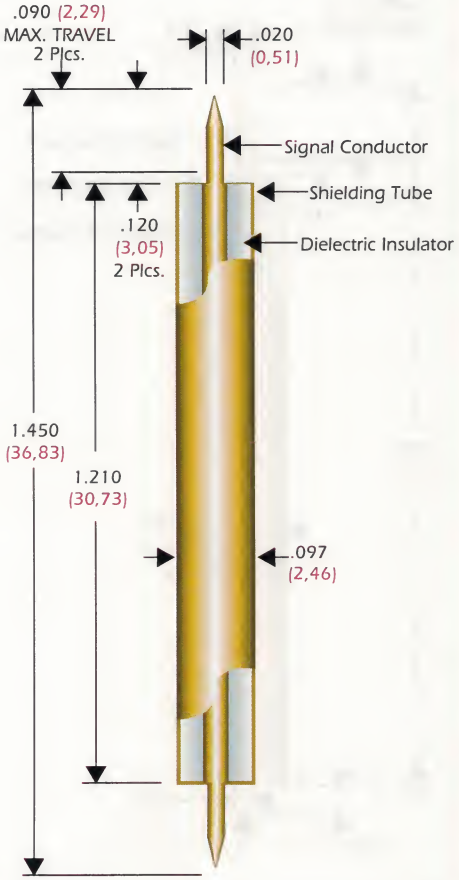
MATERIALS

Contact Barrel—Brass, gold plated
Springs—
Signal Conductor: Stainless steel, gold plated
Shielding Plunger: Stainless steel, gold plated
Shielding Plunger—Beryllium copper, gold plated
Dielectric Insulator—Teflon
Shielding Tube—Stainless steel, gold plated
Signal Conductor—Series S, Size 00 probe with flanged barrel

HOW TO ORDER

100290-00 Without Flange
100290-03 With Flange

Double Ended without Shielding Plungers



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.150 (3,81)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—
Signal Conductor: 1.3 oz. @ .050 travel (each end)

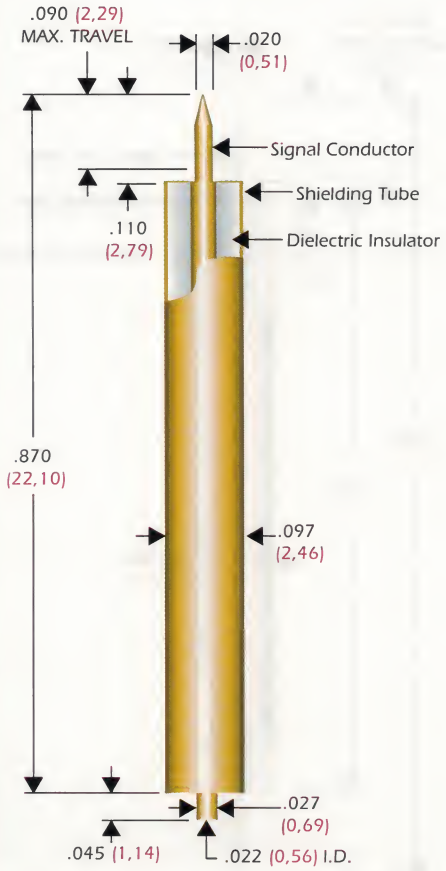
MATERIALS

Shielding Tube—Stainless steel, gold plated
Spring—Stainless steel, gold plated
Dielectric Insulator—Teflon
Signal Conductor—Series S, Size 00 probe with flanged barrel

HOW TO ORDER

100336-00

Single Ended without Shielding Plunger



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.150 (3,81)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—
Signal Conductor: 1.3 oz. @ .050 travel

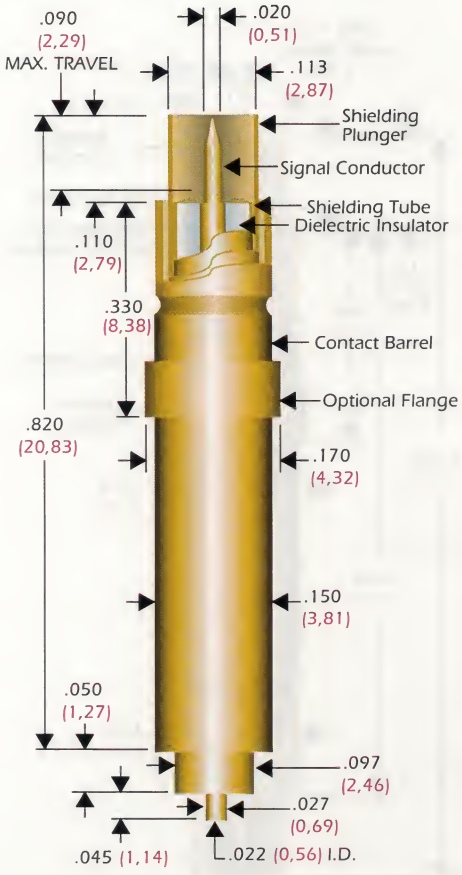
MATERIALS

Shielding Tube—Stainless steel, gold plated
Spring—Stainless steel, gold plated
Dielectric Insulator—Teflon
Signal Conductor—Series S, Size 00 probe

HOW TO ORDER

100305-00

Single Ended with Shielding Plunger



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.200 (5,08)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.070 (1,78)
Spring Force—
Signal Conductor: 1.6 oz. @ .070 travel
Shielding Plunger: 4.3 oz. @ .070 travel

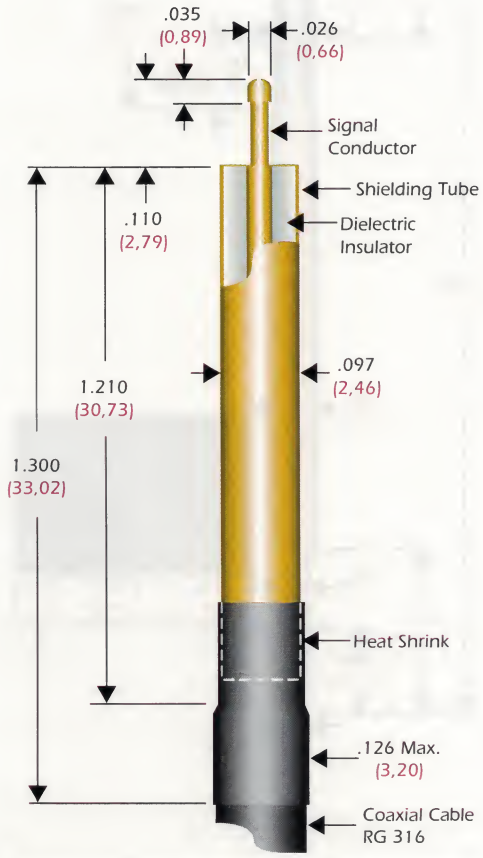
MATERIALS

Contact Barrel—Brass, gold plated
Springs—
Signal Conductor: Stainless steel, gold plated
Shielding Plunger: Stainless steel, gold plated
Shielding Plunger—Beryllium copper, gold plated
Dielectric Insulator—Teflon
Shielding Tube—Stainless steel, gold plated
Signal Conductor—Series S, Size 00 probe

HOW TO ORDER

100304-00-B Without Flange
100304-01-B With Flange

Single Ended without Shielding Plunger Preattached Coaxial Cable



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.150 (3,81)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.050 (1,27)
Spring Force—
Signal Conductor: 1.3 oz. @ .050 travel

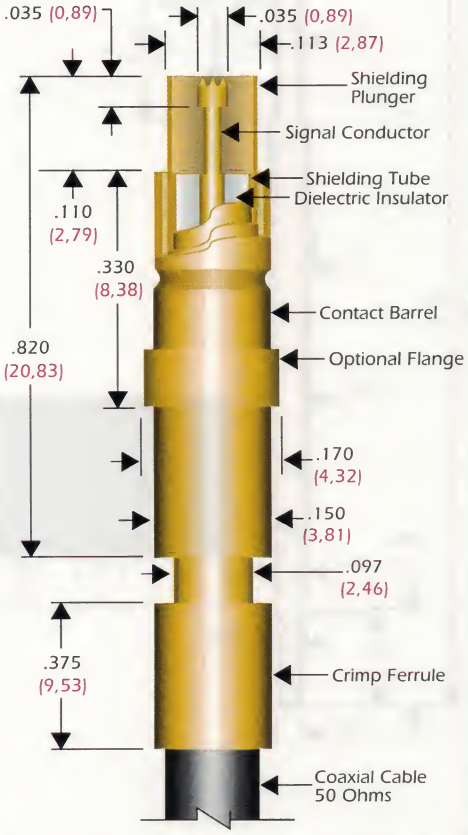
MATERIALS

Shielding Tube—Stainless steel, gold plated
Spring—Beryllium copper, gold plated
Dielectric Insulator—Teflon
Signal Conductor—Series S, Size 00 probe
Coaxial Cable—RG 316

HOW TO ORDER

100526-31-XX-X
(Connector: A- SMA, N-none)
(cable length in inches)

Single Ended with Shielding Plunger Preattached Coaxial Cable



PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.200 (5,08)
Nominal Impedance—50 Ohms
Current Rating—3 amps continuous
Recommended Working Travel—.070 (1,78)
Spring Force—
Signal Conductor: 2.0 oz. @ .070 travel
Shielding Plunger: 4.3 oz. @ .070 travel

MATERIALS

Contact Barrel—Brass, gold plated
Springs—
Signal Conductor: Beryllium copper, gold plated
Shielding Plunger: Stainless steel, gold plated
Shielding Plunger: Beryllium copper, gold plated
Dielectric Insulator—Teflon
Shielding Tube—Stainless steel, gold plated
Signal Conductor—Series S, Size 00 probe
Crimp Ferrule—Brass, gold plated
Coaxial Cable—RG 174U

HOW TO ORDER

100445-00-XX-X Without Flange
100445-01-XX-X With Flange
(Connector: A- SMA, N-none)
(cable length in inches)

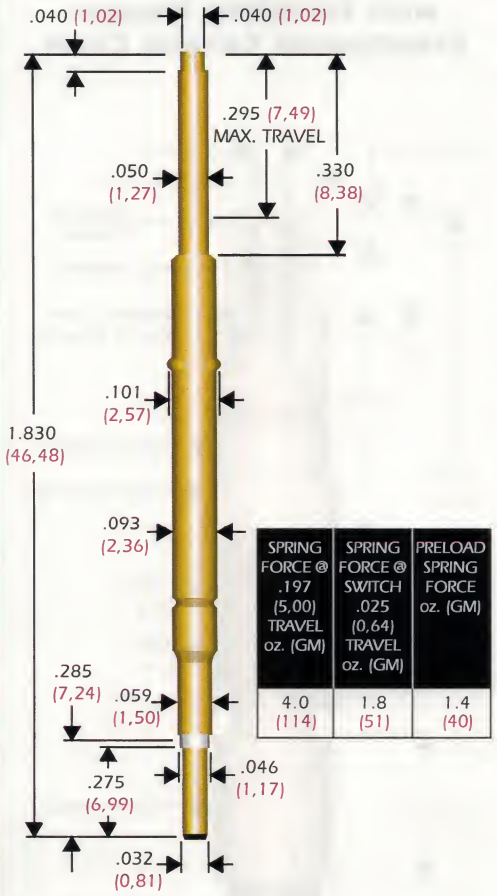
Switch Probes

A Switch Probe is a spring contact probe and receptacle combination that is normally open, and after a designated travel the switch probe closes. The most common use for switch probes is in the cable harness testing industry. The switch probe is used to verify the correct location of a terminal in a connector while checking the retention force as well.

Switch probes also verify the presence of nonconductive components such as caps for connectors or devices on a circuit board.

There are two separate current paths in a switch probe. From the plunger tip to the tail is normally open and closes only after the probe deflects to the designated travel. The second path, from the plunger tip to the outside of the receptacle is always closed.

Size SW3



SPRING FORCE @ .197 (5,00) TRAVEL oz. (GM)	SPRING FORCE @ SWITCH .025 (0,64) TRAVEL oz. (GM)	PRELOAD SPRING FORCE oz. (GM)
4.0 (114)	1.8 (51)	1.4 (40)

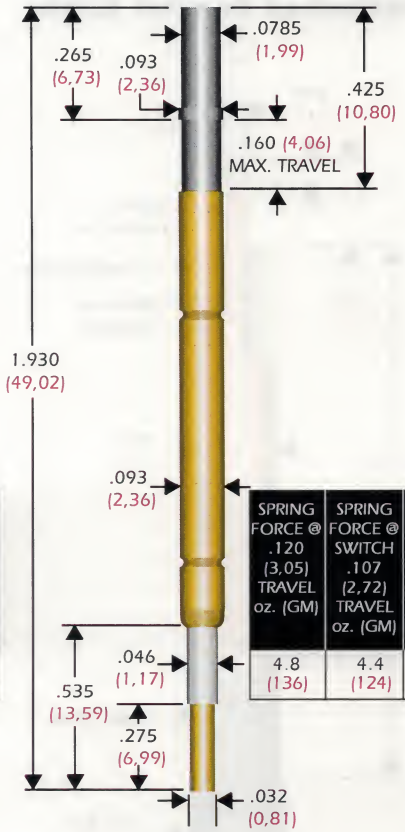
PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.125 (3,17)
Current Rating—3 amps continuous
Travel to Switch Point—.025 (0,64)
Spring Force at Switch Point—1.8 oz.
Recommended Working Travel—.197 (5,00)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Springs—Music wire
Plunger—Beryllium copper, gold plated
Insulator—Delrin
Contact—Beryllium copper, gold plated

Size SW4



SPRING FORCE @ .120 (3,05) TRAVEL oz. (GM)	SPRING FORCE @ SWITCH .107 (2,72) TRAVEL oz. (GM)	PRELOAD SPRING FORCE oz. (GM)
4.8 (136)	4.4 (124)	2.5 (71)

PROBE TECHNICAL SUMMARY

Recommended Minimum Centers—.156 (3,96)
Current Rating—3 amps continuous
Travel to Switch Point—.107 (2,72)
Spring Force at Switch Point—4.4 oz.
Recommended Working Travel—.120 (3,05)

MATERIALS

Contact Barrel—Nickel/silver, gold plated
Springs—Stainless steel, gold plated
Plunger—Beryllium copper, gold plated
Insulator—Delrin
Contact—Beryllium copper, gold plated

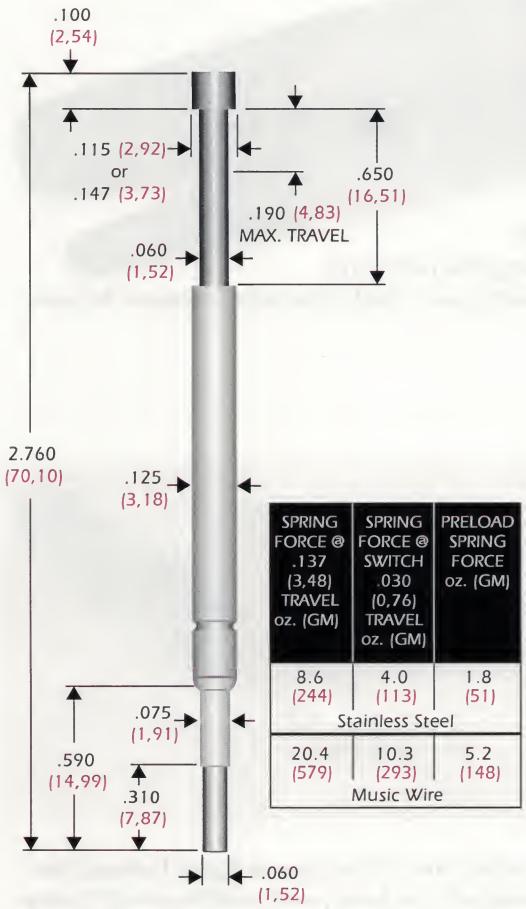
HOW TO ORDER

SW	3	CS	1.8	G
SPRING CONTACT PROBE	**SIZE** Size 3 or 4	**TIP STYLE** Size 3–CS Size 4–C	**SPRING FORCE at SWITCH** Size 3–1.8 Size 4–4.4	**PLUNGER PLATING** Size 3–G Size 4–EN

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

View updates of this information at http://www.idinet.com

Size SW5



SPRING FORCE @ .137 (3,48) TRAVEL oz. (GM)	SPRING FORCE @ SWITCH .030 (0,76) TRAVEL oz. (GM)	PRELOAD SPRING FORCE oz. (GM)
8.6 (244)	4.0 (113)	1.8 (51)
Stainless Steel		
20.4 (579)	10.3 (293)	5.2 (148)
Music Wire		

PROBE TECHNICAL SUMMARY

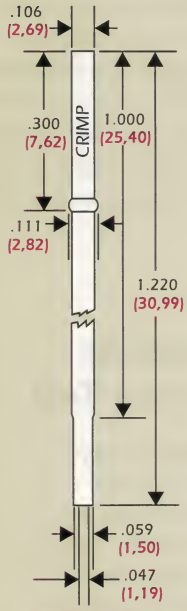
Recommended Minimum Centers—.187 (4,75)
Current Rating—3 amps continuous
Travel to Switch Point—.030 (0,76)
Spring Force at Switch Point—4.0 or 10.3 oz.
Recommended Working Travel—.137 (3,48)

MATERIALS

Contact Barrel—Nickel/silver, hard silver plated
Springs—Stainless steel or music wire
Plunger—Beryllium copper, nickel plated
Insulator—Delrin
Contact—Beryllium copper, hard silver plated

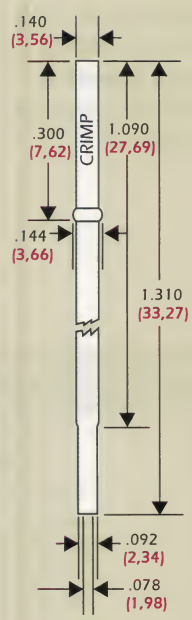
RECEPTACLE SIZES 4 & 5

Connections—
Style CR: Crimp
Material—Nickel/silver, gold plated



R-4-SW

Drill Size: #35
Mounting Hole Size:
.108/.110 (2,74/2,79)



R-5-SW

Drill Size: 3,6mm
Mounting Hole Size:
.141/.143 (3,58/3,63)

Specifications subject to change without notice.
Dimensions in inches (millimeters)

RECEPTACLE SIZE 3

The Size 3 Switch Probe shown does not require a receptacle. The barrel of the switch probe is a receptacle.

Drill Size: #41
Mounting Hole Size: .094/.096 (2,39/2,44)

View updates of this information at http://www.idinet.com

HOW TO ORDER

SW	5	F	4.0	EN	115
SPRING CONTACT PROBE	SIZE	TIP STYLE	SPRING FORCE at SWITCH	PLUNGER PLATING	HEAD DIAMETER

FAX 913-342-7043 TEL 913-342-5544 WEB http://www.idinet.com

IDI Assembly & Crimping Tools

Proper Assembly Sets Performance in Motion

You've purchased IDI probes for their quality and reliability. To help your probes give you the performance they've been designed to deliver, we want to help you properly install and maintain your IDI receptacles. We start by offering a complete line of probe installation tools, pin gages, wire strippers and crimping tools. And, if you have any questions before or during the installation process, please do not hesitate to call us.

Crimping Pliers

To crimp, insert the largest diameter portion of the receptacle directly into the hole on the flat side of the crimping pliers (Step 1). Now, take the prestripped wire and insert it into the receptacle (Step 2). Engage the crimping pliers fully (Step 3). The crimping plier clutch will release with a slight gripping action, allowing one to pull on the wire to remove the completed crimp assembly (Step 4).

Model	Receptacle Size/Blank	Wire Range
CP00T	R00T	30 GA
CP00W	R00W	30 GA
CP0	0	28-30 GA
CPRJ0	RJ0	28-30 GA
CPRC0	RC0	28-30 GA
CP1	1	24-28 GA
CPRL1	RL1	24-28 GA
CP2	2	22-26 GA
CP25	25	22-26 GA
CP3	3	22-26 GA
CP4	4	22-26 GA
CP5	5	22-26 GA
CP-SS30	RSS-30	28-30 GA
CP-SS40-T	RSS-40-T	30 GA
CP-SS40-W	RSS40-W	30 GA
CP-SS50	RSS-50	28-30 GA
CP-SS75	RSS-75	24-28 GA
CP-SS100	RSS-100	28-30 GA

Model	Receptacle Size
RT00	00
RT0	0
RTRC0, RTRJ0	RC0 & RJ0
RT1	1
RTRL1	RL1
RT2	2
RT25	25
RTRX25	25
RT3	3
RT4	4
RT5	5
RT-SS30	RSS30
RT-SS40	RSS40
RT-SS50	RSS50
RT-SS75	RSS75
RT-SS100	RSS100

Receptacle Insertion Tool

To install a receptacle, insert the receptacle into the drilled hole* (Step 1). Next, insert the receptacle insertion tool directly into the receptacle and press lightly (Step 2). This allows the receptacle to "seat" into the drilled hole. With a plastic tipped hammer, tap the top of the insertion tool until the receptacle has been positioned flush with the top of the drilled matrix (Step 3). The press ring now holds the receptacle securely in place. With the receptacle in place, the spring contact probe can now be inserted.

* Install DuraSeals® stripped end first.

Note: Special fixturing applications sometimes require that the receptacle be placed above the drilled matrix. This requires a receptacle placement at the desired height. These "special height" Receptacle Insertion Tools are offered upon request.

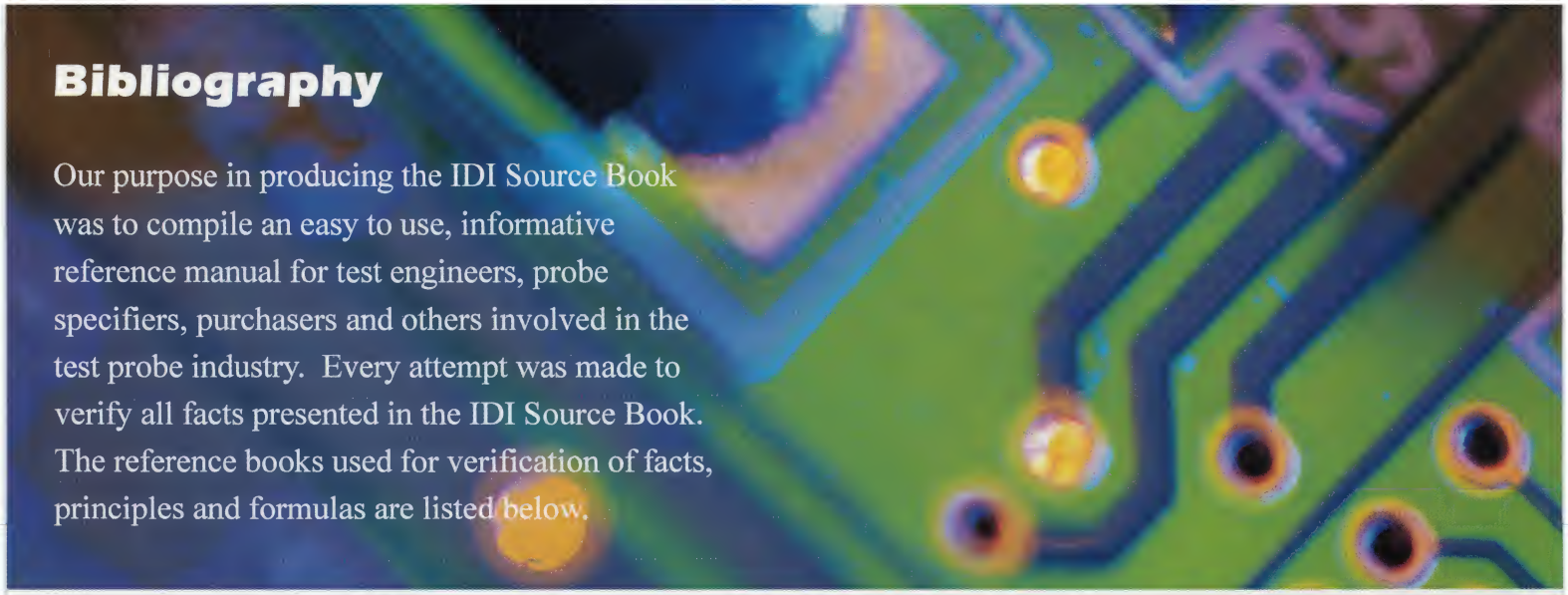
IDI

SOURCE BOOK

A Manual on Probe Design and Applications

SIXTH EDITION

Bibliography



Our purpose in producing the IDI Source Book was to compile an easy to use, informative reference manual for test engineers, probe specifiers, purchasers and others involved in the test probe industry. Every attempt was made to verify all facts presented in the IDI Source Book. The reference books used for verification of facts, principles and formulas are listed below.

ASM Metals Reference Book, Second Edition, ASM, 1983, American Society for Metals, Metals Park, Ohio 44073

Cleaning and Contamination of Electronics Components and Assemblies, B.N. Ellis, 1986, Electrochemical Publications Limited, Great Britain

Corrosion and Corrosion Protection Handbook, Second Edition, Phillip A. Schweitzer, PE., 1989, Marcel Dekker, Inc., 270 Madison Avenue, New York, New York 10016

Design Guidelines for Surface Mount Technology, Vern Solberg, 1990, TAB BOOKS Inc., Blue Ridge Summit, Pennsylvania 17924-0850

Electroless Nickel Plating, Wolfgang Riedel, 1991, ASM International and Finishing Publications Ltd.

Handbook of Spring Design, SMI, 198 1, Spring Manufacture Institute, Inc., 380 West Palatine Road, Wheeling, Illinois 60090

Gold Plating Technology, Frank H. Reid & William Goldie, 1974, Electrochemical Publications Limited, Great Britain

Mark's Standard Handbook for Mechanical Engineers, Eighth Edition, Theodore Baumeister, 1978, McGraw Hill Inc., New York

Metal Finishing Guidebook and Directory Issue 1990, Palmer H. Landgon, 1990, Metals and Plastics Publications, Inc., Three University Plaza, Hackensack, New Jersey 07601

Metals Handbook, Ninth Edition, v2., ASM, 1979, American Society of Metals, Metals Park, Ohio 44073

Printed Circuits Handbook, Third Edition, Clyde F. Coombs Jr., 1988, McGraw-Hill, Inc., New York

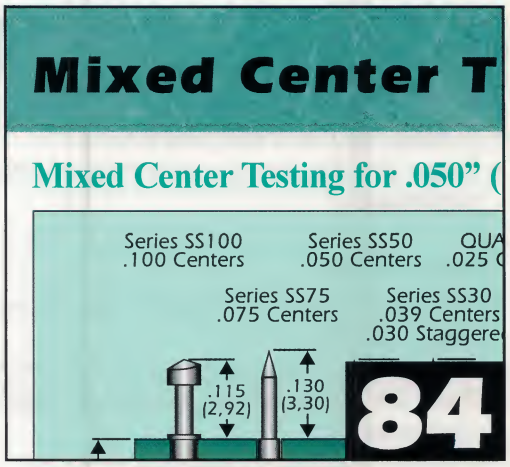
Surface Mount Technology, Ray P. Prasad, 1989, Van Nostrand Reinhold, II 5 Fifth Ave., New York, New York 10003

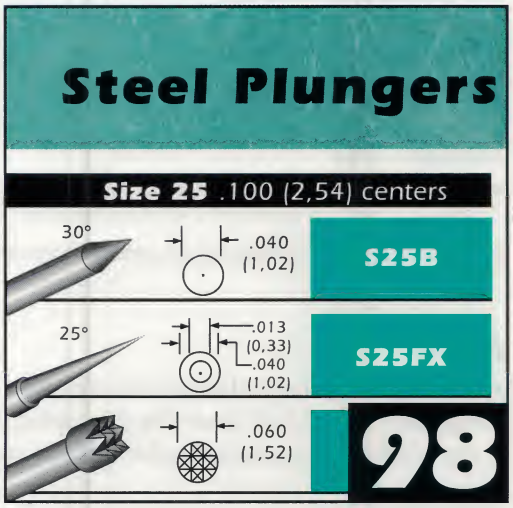
Testability Guidelines, SMTA Testability Committee, August 1991, SMTA, 5200 Wilson Road, Suite 100, Edina, Minnesota 55424

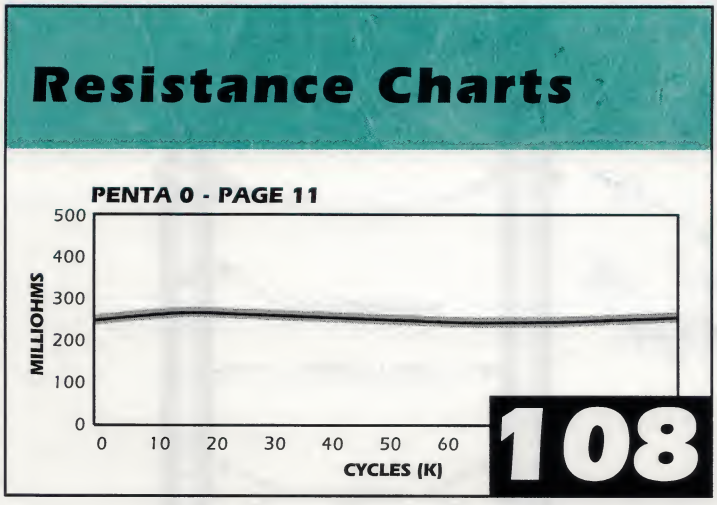
The Properties of Electrodeposited Metals and Alloys, Second Edition, AEFS, 1986, American Electroplaters and Surface Finishers Society, 12644 Research Parkway, Orlando, Florida 32826

Tool and Manufacturing Engineers Handbook, Fourth Edition, v3., Charles Wick, 1985, Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Michigan 48121

Table of Contents







Probe Terminology

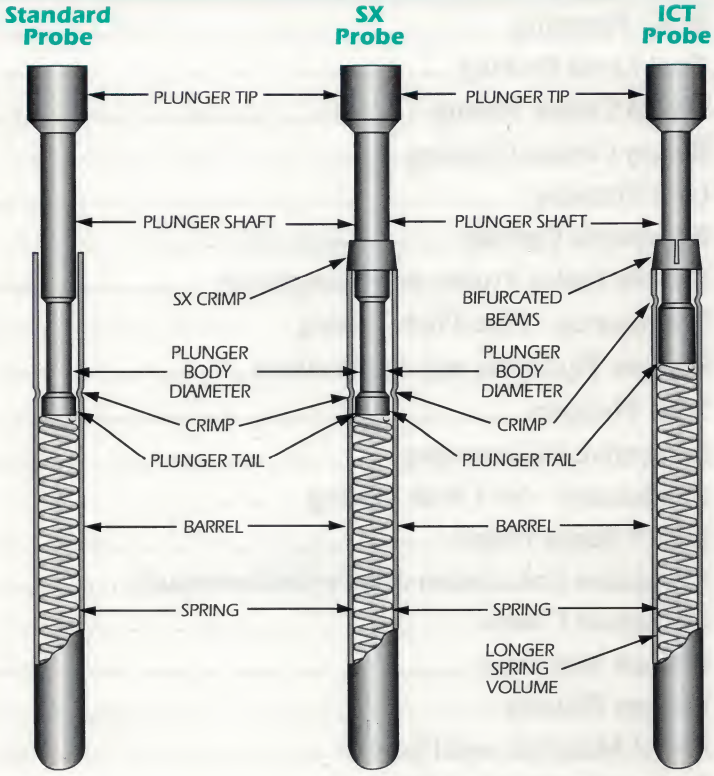
Plunger Tip Configuration
- Contacts the Unit Under Test (UUT).
- Proper configuration is critical for good contact and electrical performance.

Plunger Shaft
- The cylindrical part is critical to pointing accuracy of probe assembly.
- Primary point of electrical contact between plunger and barrel.
- Probe life is influenced by the plunger shaft's wear characteristics.

Crimp
- A precise deformation of the barrel at a specific location retains the plunger tail.
- A spin crimp, dimple crimp, or roll over crimp may be used depending on the probe series.

Plunger Tail
- The enlarged bottom part of the plunger that helps retain the plunger.
- Secondary point of electrical contact between the plunger and the barrel.

Barrel
- Housing for spring and guides the plunger.
- Typically completely housed by the mating receptacle.
- Important electrical link between plunger and receptacle.



Spring
- Helical coil spring for maintaining a consistent counter force to the plunger.
- Force determined by application.
- Base material determines probe performance in extreme temperatures.

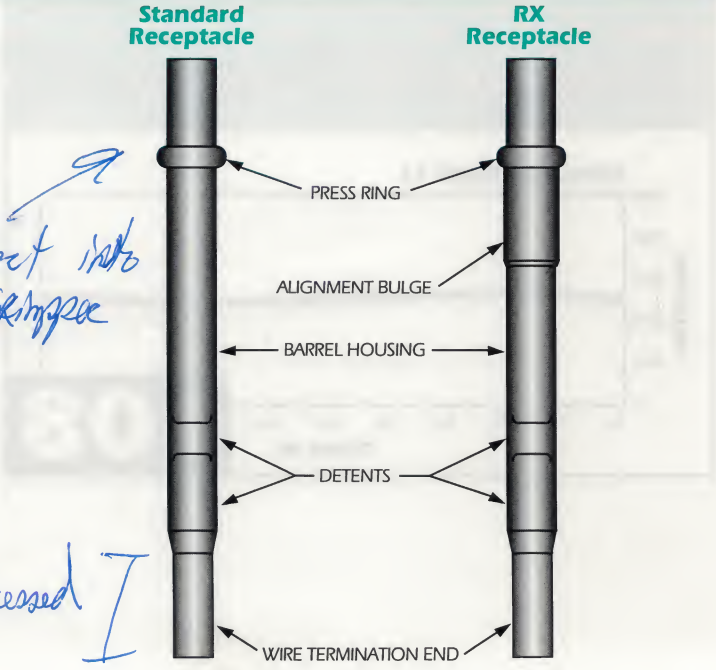
Receptacle Terminology

Press Ring
- Larger than recommended mounting hole; deforms slightly for press-fit into mounting hole.

Barrel Housing
- Critical electrical link which houses the barrel of the probe.

Detent
- Provides retention and electrical connection to probe barrel.
- Single or multiple detents based upon size.

Wire Termination
- Means to connect wire for electrical passage.
- Configured for crimping, soldering, wire wrapping, terminal insertion, or with preattached wire.



Insert with crimped

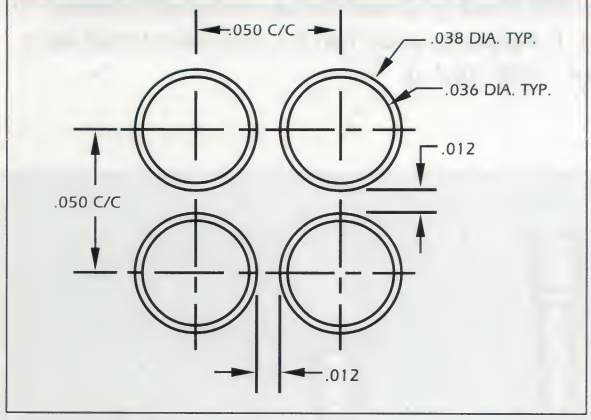
Talked with FDI on 4/4/02 to confirm which end is crimped. recessed

Recommended Minimum Centers

To prevent a potential shorting of probes, a clearance between probes is required. The recommended minimum centers, the minimum distance between the center-point of one mounting hole to the next, is determined by the probe geometry. The physical area occupied by the probe is determined by the plunger tip diameter plus its pointing accuracy, or the mounting hole diameter, whichever is larger.

For Example: Size 0	
Recommended minimum centers	.050″
Mounting hole diameter	.036″
Head diameter	.035″
Pointing accuracy range	.003″
Head diameter + Pointing accuracy range	
	= .035 + .003 = .038″
The space occupied by the probe is .038″ in diameter.	
Clearance between probes:	.050 - .038 = .012″

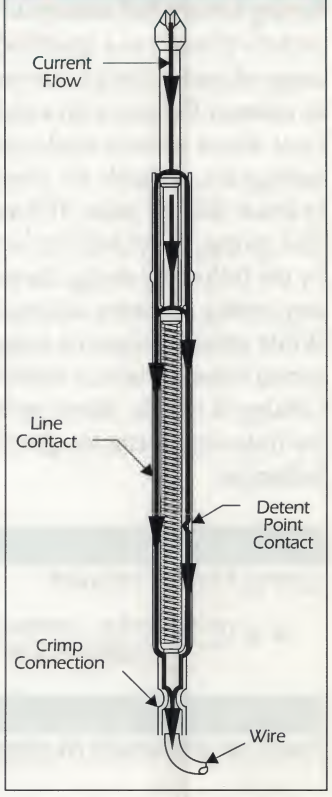
Recommended Minimum Target Centers



The hole diameter and the center distance between probes dictate the amount of mounting plate material between receptacles. The amount of material is critical in maintaining the stiffness of the mounting plate. Should the integrity of the mounting plate be endangered, possible alternatives include choice of different material, a thicker mounting plate or use of smaller diameter probes.

Current Rating

Typical Current Flow

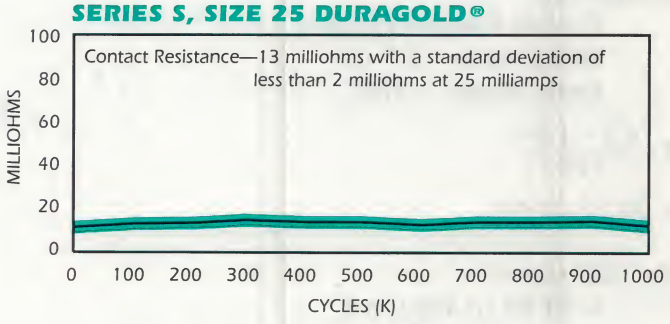


The current rating of the Spring Contact Probe is determined by the power (heat) generated by the current and resistance (I^2R) and the ability of the probe and mounting plate to dissipate this heat. The base material, plating and bulk size of the probe are critical in determining the current rating. Also taken into consideration are the mounting centers, the mounting material, the ambient temperature and the duty cycle.

Contact Resistance

The resistance of a Spring Contact Probe is dependent upon the base materials, platings and physical design. The typical current path of a probe is from the plunger to the barrel and then through the receptacle and out to the wire. Approximately 99% of the current will follow this path. The remaining 1% of the current will flow through the spring. The chart below shows the typical resistance of a Size 25, DuraGold Spring Contact Probe.

SERIES S, SIZE 25 DURAGOLD®



Spring Force

Spring force is the amount of force required to compress a probe's plunger to a specified distance. IDI offers a wide range of spring forces. Lower force springs are typically used in vacuum fixtures with a high probe population and applications where witness marks are undesirable. Higher force springs are available for penetrating contaminated test points in lower density areas. IDI uses a helical compression spring. The spring rate of a helical coil spring is determined primarily by the following design factors: spring material, wire diameter, spring diameter and number of coils per unit length. While spring design is a complex process, determining the spring force at various deflections not specified in the IDI Catalog is simple. Since spring forces are linear (F=kx), the following formulas give the spring force at any given deflection.

FORMULA 1:

Spring Force Constant

$$k = \frac{\text{rated force - preload force}}{\text{rated travel}}$$

FORMULA 2:

Force at deflection of distance x

$$F = kx + \text{preload force}$$

FOR EXAMPLE:

The Size 25, 6.7 oz. spring has the following specifications.*

Preload Force - 1.5 oz.
Rated Force - 6.7 oz.
Rated Travel - .170"

$$k = \frac{6.7 - 1.5}{.170}$$

$k = 30.59$ oz./in.

F @ .140" travel
= 30.59 (.140) + 1.5
= 5.8 oz.

F @ .190" travel
= 30.59 (.190) + 1.5
= 7.3 oz.

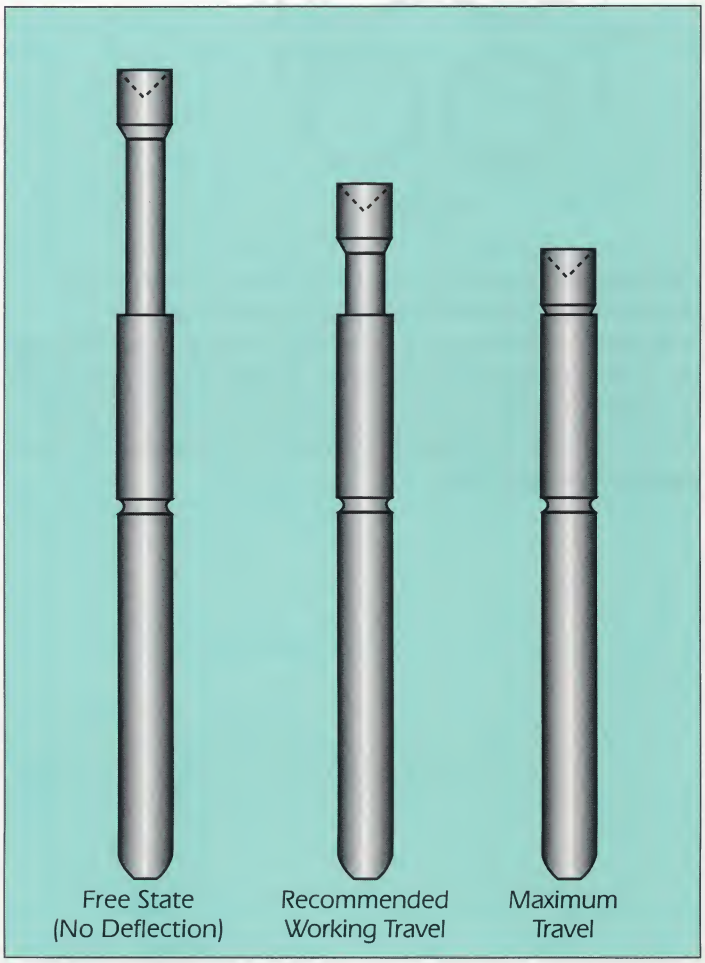
* These specifications are supplied for all IDI springs in the catalog section.

Recommended Working Travel

The recommended working travel, also known as rated travel, is typically 2/3 of the maximum travel. Depending on the spring design, compressing a probe beyond its recommended working travel can create undue stress on the spring. The fully compressed length of probes can vary up to .010" (0,25) without considering variations in receptacle mounting heights. Consequently, testing at full stroke can potentially damage the plunger tip or the device under test (DUT). If testing past recommended working travel is required, please contact IDI for assistance in choosing a probe for your specific requirements.

Maximum Travel

Maximum travel is the maximum distance that a probe may be compressed. The small body diameter of the probe controls the maximum travel if the probe tip is headless. If the probe tip is headed, the bottom of the tip making contact with the barrel controls the maximum travel distance. The maximum travel listed in the IDI Catalog is based upon a nominally dimensioned part. It should be noted that the maximum travel has a tolerance of ± .005" (0,13).



Operating Temperature

Lubrication and spring material determine the operating temperature of a probe. Most probes are lubricated to increase mechanical life and have a maximum operating temperature of 120°C. Probes operating outside of this range should be non-lubricated. Spring material is the other factor affecting the maximum operating temperature of a probe. Various materials lose their spring properties (anneal) at different temperatures. The chart below lists the operating temperatures for the various spring materials lubricated and non-lubricated.

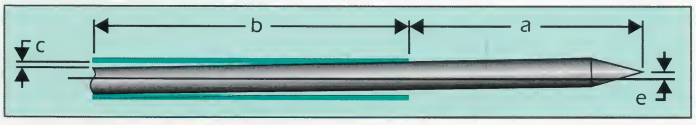
	Music Wire	Beryllium Copper	Stainless Steel
Lubricated			
Min.	0°C	-55°C	-55°C
Max.	120°C	120°C	120°C
Nonlubricated—1 hr. exposure			
Min.	0°C	-55°C	-55°C
Max.	120°C	205°C	260°C
Nonlubricated—24 hr. exposure			
Min.	0°C	-55°C	-55°C
Max.	85°C	120°C	180°C

Pointing Accuracy

Probe pointing accuracy is the maximum radial departure of a probe tip from the center-point of the probe's mounting hole. There are several variables that contribute to a probe's pointing accuracy. Those variables include tolerances related to the probe, probe and receptacle combination, and the test fixture. The formula below calculates pointing accuracy for any of the IDI Catalog probes.

$$e = \pm c\,(a/b + 1/2)$$

where: e = pointing accuracy
c = maximum working clearance
a = extended length of the plunger
b = retained length of the plunger

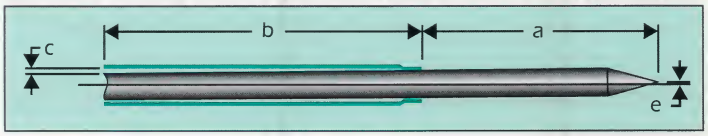


Size 25 Spring Contact Probe

a = .330″ b = .335″ c = .002″

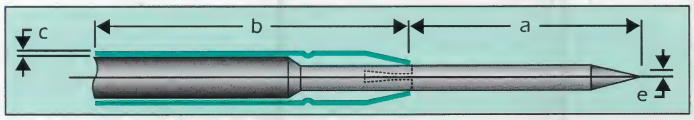
e = ± .002(.330/.335 +.5)
= ± .002(.985 + .5)
= ± .002(1.485)
= ± .003″

To calculate the pointing accuracy of an SX probe, use the following formula:



e = ± c(.625 a / b + .125)
= ± .002((.625 • .330) / .335) + .125)
= ± .002((.206 / .335) + .125)
= ± .002(.615 + .125)
= ± .002(.74)
= ± .0015″

To calculate the pointing accuracy of an ICT probe, use the following formula; where a=.330, b=.232, c=.0016:

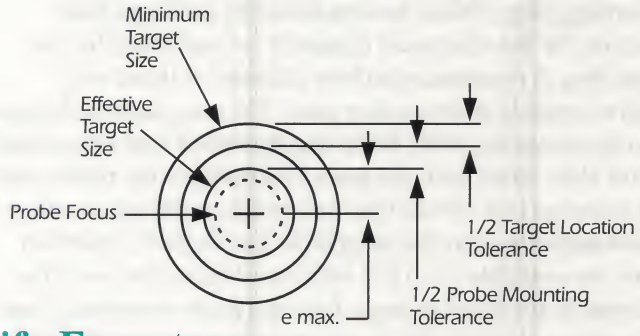


e = ± 1/2c(a / b)
= ± 1/2(.0016)(.330/.232)
= ± .0008(1.422)
= ± .0011″

Tolerance extremes, as well as several other variables, are not addressed by this formula. To determine the minimum required pointing accuracy in any given application:

For Example:

$$\text{Minimum required pointing accuracy} = \left[\text{Minimum target size} - \text{Target location tolerance} - \text{Probe mounting tolerance}\right]$$



Life Expectancy

Generally, IDI probes are rated at 1,000,000 cycles minimum in laboratory testing. Actual life in the field is dependent upon several factors including proper use, fixture quality, temperature/cleanliness of environment and maintenance.

Basic Probe Fixturing

Spring loaded contact probes are used in many industries, for many types of test. The type of fixture required for automated inspection of a ball grid array package differs greatly from one used for manufacturing defects analysis of a printed circuit board assembly. Any general discussion of probe fixturing must necessarily be limited in scope to the most common types of fixturing.

The archetypical IDI spring contact probe is used in combination with a receptacle, which is designed to be press-fit into a probe plate. An arrangement must be made to guide the unit under test (UUT) onto the probes, and a source of mechanical force to drive the UUT must also be provided. This section will address these issues, beginning with the probe plate.

The probe plate must be made of a material which is suitable for precision drilling, and rigid enough to support the combined force of the probes without flexing. In the United States, the most common probe plate material is Garolite, also known as G-10 (or FR-4 in its fire-retardant grade). G-10 is a fiberglass laminate that allows precise machining, is very thermally stable, and is extremely rigid. Other suitable materials include composites and laminates such as phenolic and Bakelite but are more difficult to work with. Lexan and various acrylics are commonly used materials. Delrin and ABS thermoplastics are to be avoided, as they are thermally unstable.

The probe plate should be thin enough to be drilled with an accurate hole, and yet thick enough to provide adequate rigidity and sufficient guidance for the receptacle. For longer probes, with .250" travel, a thickness of .375" (9,53) to .500" (12,70mm) is recommended. For shorter probes, with .050" to .100" travel, a thickness of 0.250" (6,35mm) is adequate.

The IDI receptacle is designed to press-fit into the probe mounting plate. This is accomplished by drilling a hole oversize for the receptacle diameter, yet undersize for the press ring. A recommended hole diameter is listed with each receptacle on its catalog page. The receptacle is dropped into the mounting hole; if the recommended hole size is used, it will slide down until the press ring contacts the probe plate. An insertion tool should then be used in combination with a nylon mallet to drive the receptacle into the hole. Insertion tools are available from IDI which will leave the top of the receptacle at a fixed distance from the probe mounting plate. The degree to which this is necessary is determined by the arrangement for guiding the UUT down onto the probes.

Once the receptacles have been installed in this manner, wiring should be completed. Probes can then be inserted into the receptacles to populate the fixture. The probes should be inserted using a piece of plastic pressing on the probe tips. Use of a metal tool to insert probes into receptacles may damage delicate tips. Care should be taken not to apply more force than is necessary to completely seat probes in receptacles.

The matter of UUT guidance is dependent on the type of test performed. Loaded printed circuit board assemblies may be mounted above the probes on a floating plate with a guide plate for the probes. In this instance, it is critical that registration pins pass through the guide plate to the probe plate, so that the UUT is accurately registered to the probe array. The UUT may also be aligned with clips but final alignment should always depend on the insertion of a registration pin into a tooling hole on the printed circuit board.

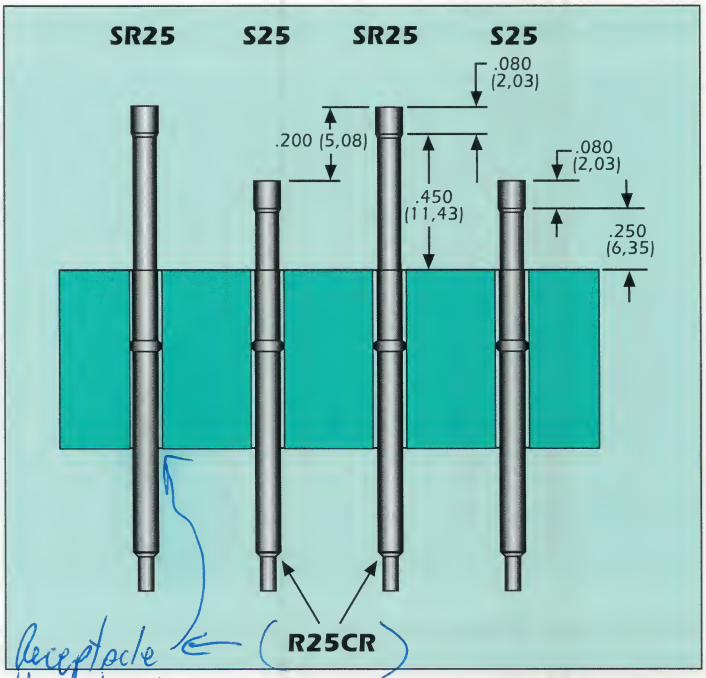
In bare board test fixturing, it is much more common to drive the UUT directly onto the probes. A stripper plate is commonly used to protect probes from overtravel. Again, registration pins mounted in the probe plate must pass through tooling holes on the UUT.

The final consideration is the application of force to drive the UUT down onto the probes. This depends on the design of the tester; most bareboard testers and many loaded board testers will have a pneumatically driven ram, which uses a plate or nylon fingers to press on the top of the board. Loaded board testers may have a provision for the use of vacuum to pull the board down. Mechanical fixture kits are available from many vendors for use with testers without provision of force.

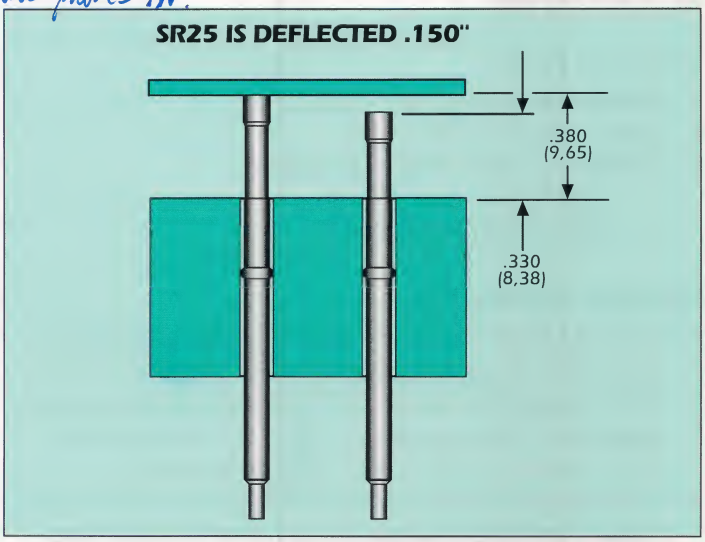
Dual Level Probing

IDI has designed the SR-25, .400" (10,16) - long stroke probe, to work with the S-25 in dual-level (functional and in-circuit) test fixtures. Dual-level probing has been greatly simplified by the SR-25 Series probe. The SR-25 and standard S-25 probes can be installed in identical (R-25) standard receptacles. As test needs change, probes can be interchanged freely from one receptacle to another. The figures below show the typical installation for a dual level probing application.

The SR-25 extends .530" (13,46) above the receptacle and has a maximum stroke of .400" (10,16). The S-25 probe extends .330" (8,38) above the receptacle and has a maximum stroke of .250" (6,35).

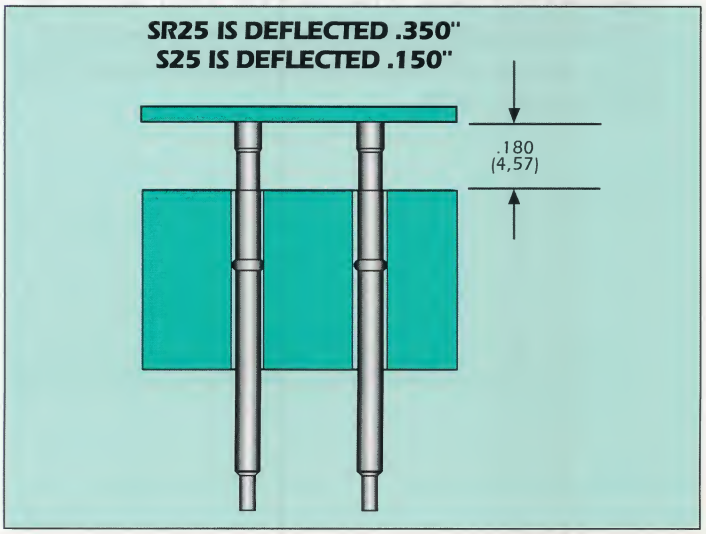


For dual level probing, the first test can be run by compressing the fixture .150" (3,81). This results in the SR-25 probe being deflected .150" (3,81) and a .050" (1,27) space between the board and the S-25 probe. This first test is typically a functional test.

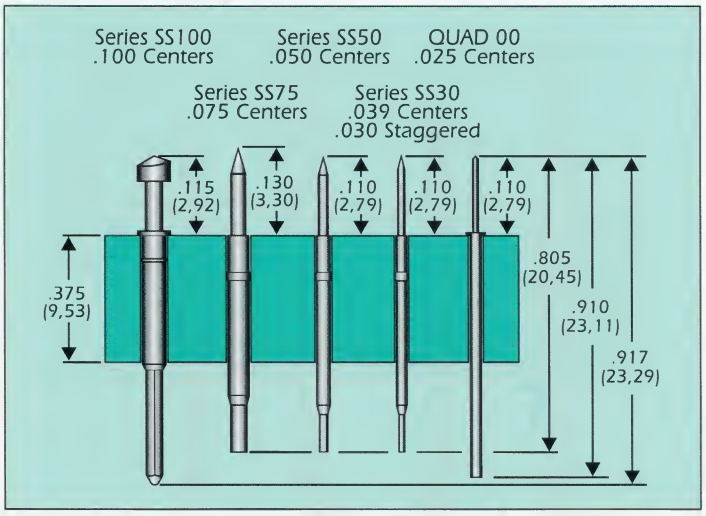


The final test can be run by compressing the board an additional .200" (5,08), resulting in a total deflection of .350" (8,89) for the SR-25 probe, and .150" (3,81) for the S-25 probe.

The same concept applies for probes at different lengths with different center spacing. Various combinations of staggered receptacle heights and the options of probes with various strokes are available to mix and match for dual level probing.



Mixed Center Testing for .050" (1,27) Stroke



Mixed Center testing for .050" (1,27) Stroke probes, shows a typical installation of the Quad 00, SS30, SS50, SS75, and SS/GSS.

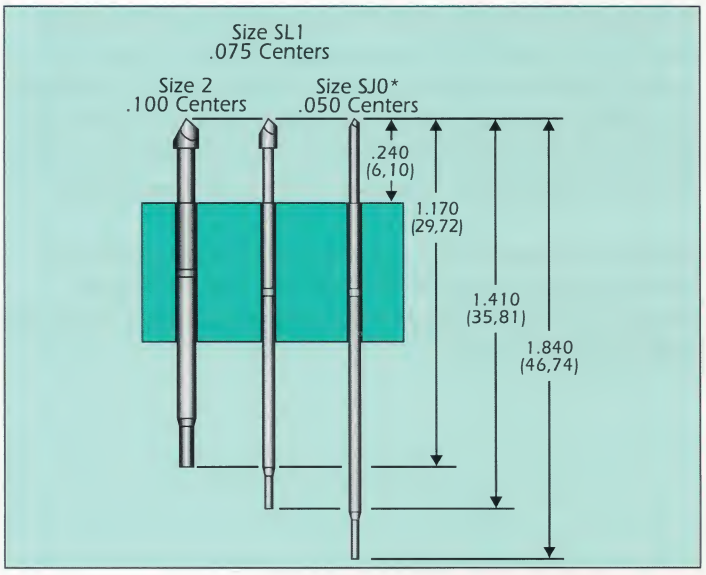
Common Factors

- Maximum travel is .050" (1,27).
- Rated travel is .050" (1,27).
- Except for Quad 00 and SS30 probe.
  .100" (2,54) Max. Travel
  .067" (1,70) Rated Travel

Special Considerations

- The SS/GSS probe can be used with other probe assemblies without any complications. When installed, the SS/GSS receptacle extends .015" (0,38) above the mounting plate, for a total extension of .115" (2,92) (assuming a SS/GSS probe with a .040" (1,02) head length).
- The plunger extension of the SS75 probe is .130" (3,30). Since the SS/GSS receptacle can not be installed other than described above. When the SS30, SS50, and the SS/GSS are used with the SS75, the SS75 will travel .050" (1,27), and the SS30, SS50, and SS/GSS will travel .030" (0,76) to .035" (0,89).

Mixed Center Testing for .160" (4,06) Stroke



Mixed Center Testing for .160" (4,06) Stroke, shows a typical installation of Size 2 and SL1.

Common Factors

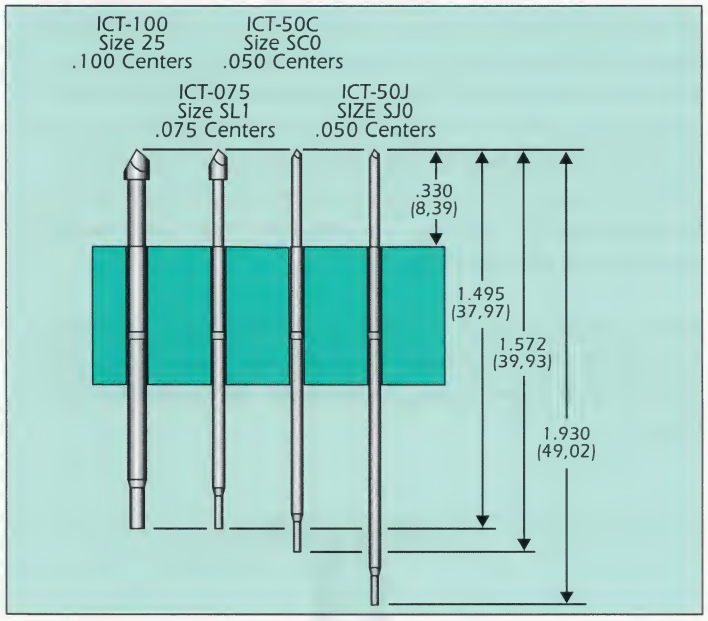
- Probe extension from receptacle is .240" (6,10).
- Maximum travel is .160" (4,06).
- Rated travel is .100" (2,54).

Special Considerations

- The press ring location of the Size 2 receptacle is .230" (5,84) instead of .300" (7,62) for the SL1. The mounting plate should be thick enough to accommodate both press rings.

* The SJ0 shown in the figure is a slight modification of a catalog product. Consult IDI for more information.

Mixed Center Testing for .250" (6,35) Stroke

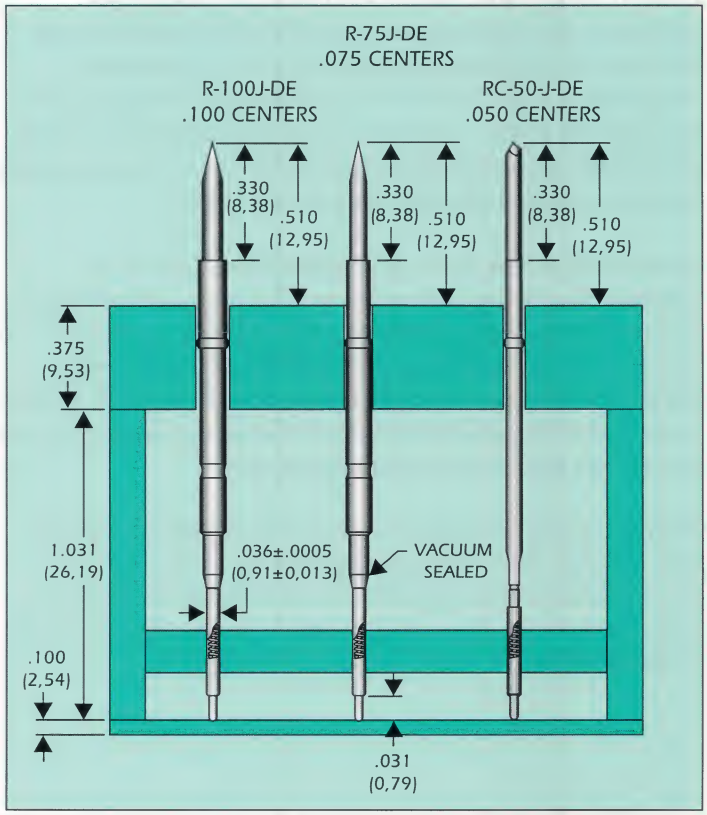


Mixed Center Testing for .250" (6,35) Stroke, shows the typical installation of the Size 25, SL1, SC0, and SJ0 probes and the ICT Series probes.

Common Factors

- Probe extension from the receptacle for all assemblies is .330" (8,38).
- Receptacle press rings are located at .300" (7,62).
- Maximum travel is .250" (6,35).
- Rated travel is .170" (4,32).

Mixed Center Testing for .250" (6,35) Stroke (Wireless Fixture)



Mixed Center Testing for .250" (6,35) Stroke in a wireless fixture, shows the typical installation of the Size 25, SL1, SC0, ICT-100, ICT-075 and ICT-50C probes.

Common Factors

- Probe extension from the receptacle for all assemblies is .330" (8,38).
- Receptacle press rings are located at .300" (7,62).
- Maximum travel is .250" (6,35).
- Rated travel is .170" (4,32).
- Bottom probe maximum travel is .100" (2,54).
- Bottom probe rated travel is .067" (1,70).

Battery Contact Fixturing

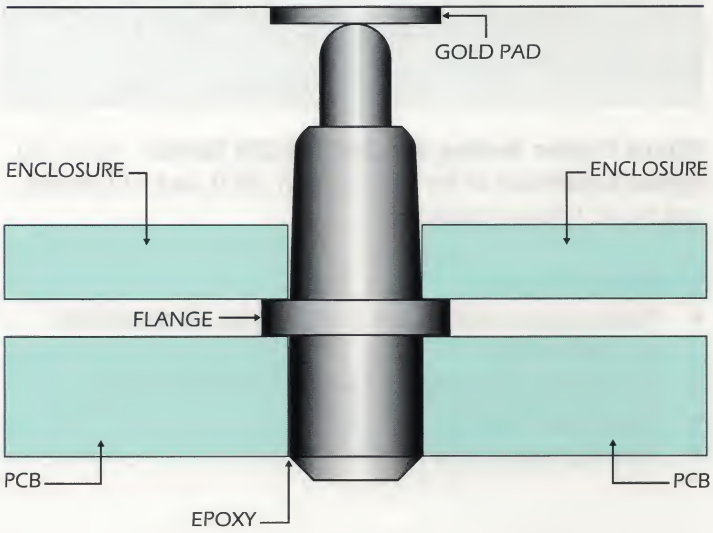
Battery Contacts and Interconnect Probes are designed to optimize contact performance in high-reliability, multiple cycle interconnect applications. Examples of typical applications include: the connection between a mobile radio's Printed Circuit Board and its battery, a board-to-board interconnect for docking of a portable device to its programming station, or an interconnect between a camera body and a powered zoom lens.

Spring Contact Probes are self-contained contacts with an internal helical spring for compliance. For years, Spring Contact Probes have been used to provide a high reliability compliant interconnect between test systems and Printed Circuit Boards. Battery Contacts and Interconnect Probes are simply an evolution of the Spring Contact Probe concept with a design suitable for use in consumer and portable electronic products.

Battery Contact and Interconnect Probe designs are typically very compact and durable, thus providing a very high cycle life. Simultaneously, the product's electrical performance is maximized to provide a reliable path for either a power supply or signal path.

Since Battery Contacts are typically components of systems and are not necessarily used for testing, they are designed to mount in a columnar format inside a via on a Printed Circuit Board (see figure below). Similar to a leaded device on a Printed Circuit Board, Battery Contacts are designed to be soldered to a Printed Circuit Board from the bottom side once the device is mounted. Some caution must be used in this process. Some Battery Contact designs have a small hole in the bottom of the housing. It is important that solder not wick up inside the spring cavity.

Most designs integrate a flange on the housing of the contact. The flange allows contacts to be mounted at similar heights and orients the contact perpendicular to the Printed Circuit Board.



Coaxial Spring Probe Fixturing

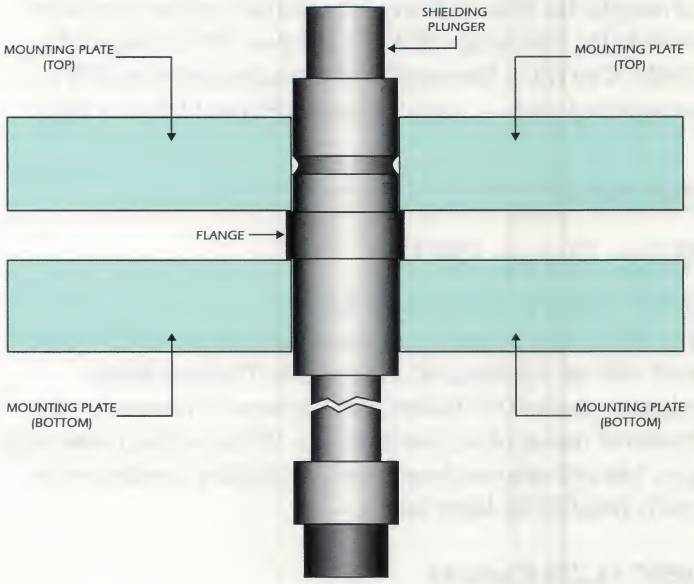
For high frequency testing, IDI's patented Coaxial Spring Probe provides electrical performance up to 3 GigaHertz (with shielding plunger) and 500 MegaHertz (without shielding plunger).

Typically the application dictates the selection of the coaxial probe to be used. Each coaxial probe is dimensionally different, thus creating a high level of fixturing customization, although some basic concepts are universal.

Coaxial Probes have the option of being double-ended (compliant on both ends) or single-ended (compliant on one end), and most have an option for a flanged contact barrel. Many single-ended coaxial probes come with a pre-attached coaxial cable and are terminated with an optional SMA connector.

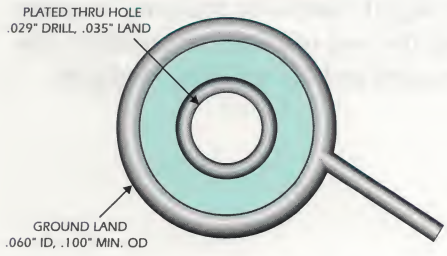
Coaxial Probes with a flanged barrel can be mounted via two fixture plates. The two fixture plates are mounted above and below the flange and bolted together at the corners of the fixture to retain the coaxial probe in the fixture (as seen in the figure to the right). Caution should be used in this fixturing arrangement when using a pre-attached SMA connector on the end of the coaxial cable. The diameter of the SMA connector is larger in diameter than the contact barrel of the Coaxial Probe. This makes it difficult for the Coaxial Probe with connector to slip through the bottom fixture plate.

TYPICAL FIXTURING

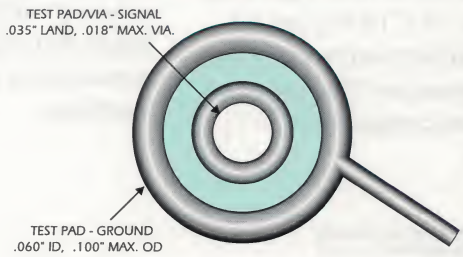


Another method for fixturing Coaxial Probes is to simply epoxy the contact barrel to the fixture substrate. This method can be used for virtually all IDI Coaxial Probes. It is not common for whole Coaxial Probe assemblies to be replaced because the signal conductor of the assembly is often replaceable with a standard probe (consult factory for probe replacement options).

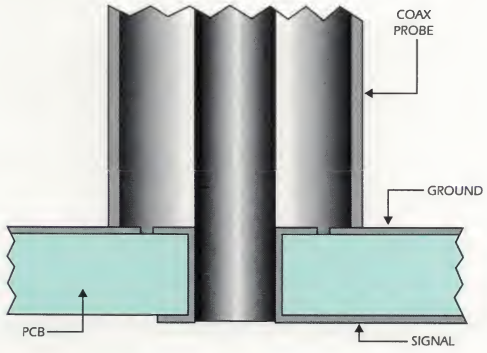
MOUNTING FOOTPRINT



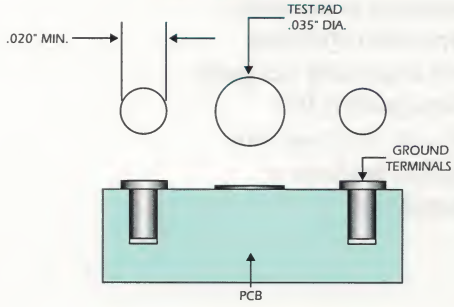
TEST PAD OPTION 1



The footprint of test pad/via, signal and test pad, and ground should be laid out similar to the footprint illustrated in the figure to the left. The test pad with ground is only required for Coaxial Probe applications using the shielding plungers. Consult factory for alternate tip styles.



TEST PAD OPTION 2



Receptacle Options

For convenience and reliability, IDI offers the largest variety of receptacles in the industry. Termination options available include the wire wrap (WW), round post (RP), crimp (CR), Solder Cup (SC), Duraseal® (DS), preattached wire (PW), preattached wire — vacuum sealed (PS) and EZ wire plug.

Wire Wrap (WW)

.075" (1,91) Centers and Above

For .075" (1,91) centers and above, IDI offers a .025" (0,64) post with an extension of .375" (9,53). The least labor-intensive method for fixture manufacturers is commonly the preferred means of wire termination. While tooling (wire wrap gun, bits and sleeves) is required, the initial expenditures are easily justified by labor savings.

.050" (1,27) Centers

IDI offers two different wire wrap terminations. A .016" (0,41) square post wire wrap, .250" (6,35) extension and a .025" (0,64) square post with a .300" (7,62) extension. The tooling required for the .025" (0,64) square post on the .050" (1,27) centers receptacle is the same as the .075" (1,91) centers wire wrap posts.

Round Post (RP)

The round post receptacle is available for use on .075" (1,91) and .100" (2,54) centers. The post length is .375" (9,53) and the post diameter is .025" (0,64). The round post can be mated to a standard edge card or other type of connector. This means of termination assures accurate and uniform contact in high-speed digital transmission applications.

Crimp (CR)

The crimp style receptacle allows the customer to manually terminate a wire to a receptacle with a specified crimping tool. The crimp receptacle requires use of a specially designed tool for wire attachment. The tools are designed by IDI specifically for each receptacle. The jaws of the crimp tool are designed to provide a gas tight crimp and conform to MIL-C-39029D when used with IDI receptacles.

Solder Cup (SC)

For low volume users of probes and receptacles, the solder cup termination method is most cost effective because it does not require any special tooling. In addition, the solder cup termination provides a solid connection between the receptacle and wire.

Preattached Wire (PW)

For a reliable connection, receptacles with preattached wire feature a military style four-jaw crimp for wire attachment. The Preattached Wire receptacle is not vacuum-sealed like the DuraSeal® style receptacle. Preattached Wire receptacles are terminated with 36" long, 30 gage violet Kynar wire with a 1" semi-strip. Optional length, gage, color and insulation types are available upon request.

EZ Wire Plug

The EZ wire plug receptacle is the quickest and easiest method of wire attachment for .050" center receptacles. Simply insert the wire into the pre-insulated receptacle. One simple step. Time studies have shown the EZ Receptacle to be up to twice as fast as similar plug-in or wire slot receptacles. This receptacle is so unique, it is patent pending. The receptacle is insulated from slightly below the press ring its entire length, thus eliminating the need of a separate insulator. The connection is vacuum sealed and will withstand multiple insertions.

DuraSeal® (DS)

Available in all .050" (1,27) center probes, the DuraSeal® is a vacuum-sealed preattached wire termination that "cold welds" the wire to the receptacle. This patented process is performed at IDI's facility so the additional step of attaching wire to the receptacle is eliminated. Further advantages include:

- Vacuum seal for reliable gas tight seal to prevent corrosion of the wire.
- Elimination of multiple connections.
- Control of wire and insulation insertion.
- Pull out force exceeds the tensile strength of the wire.

The standard DuraSeal® receptacle is furnished with a 36" long, 30 gage blue Kynar wire with a 1" semi-strip. Additional lengths, strips, colors, insulation types and gages are available.

Preattached Wire, Vacuum Sealed (PS)

For a reliable connection, receptacles with preattached wire utilize a military style four-jaw crimp for wire attachment. This process is performed at IDI's facility so the additional step of attaching wire to the receptacle is eliminated.

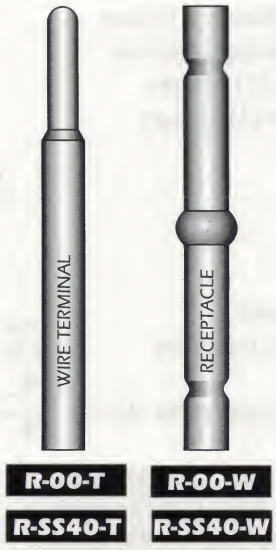
- Vacuum seal for reliable gas tight seal to prevent corrosion of the wire.
- Control of wire and insulation insertion.
- Pull out force in excess of 2 pounds.

The standard wire for the PS receptacle is 36", 30 gage blue Kynar wire with a 1" semi-strip. Additional lengths, strips, colors, insulation types and gages are available. The PS receptacle is available for the SS30 series only.

S00 Receptacle Information

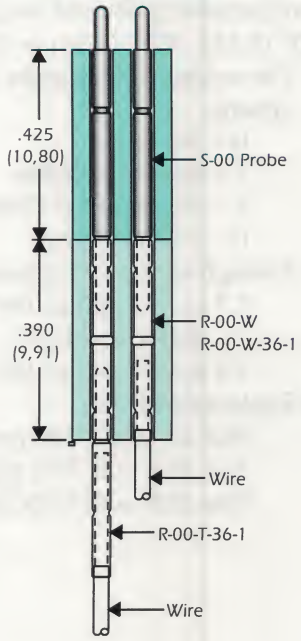
The Size 00 and SS40 receptacle (R-00-W or R-SS-40-W) houses only the bottom portion of the probe. It is necessary to drill a second plate to support the probe as shown in the drawing.

The R-00-W receptacle is available with a 36", 30 gage blue Kynar wire with a 1" semistrip preattached. When ordering without a wire, the R-00-T plugs into the R-00-W or R-SS40-W receptacle. The R-00-T is available with a 36", 30 gage blue Kynar wire with a 1" semistrip preattached, or without wire.



To order with wire:
36" long 1" semi-strip
R-00-T-36-1
R-00-W-36-1
R-SS40-T-36-1
R-SS40-W-36-1

S00 Fixturing

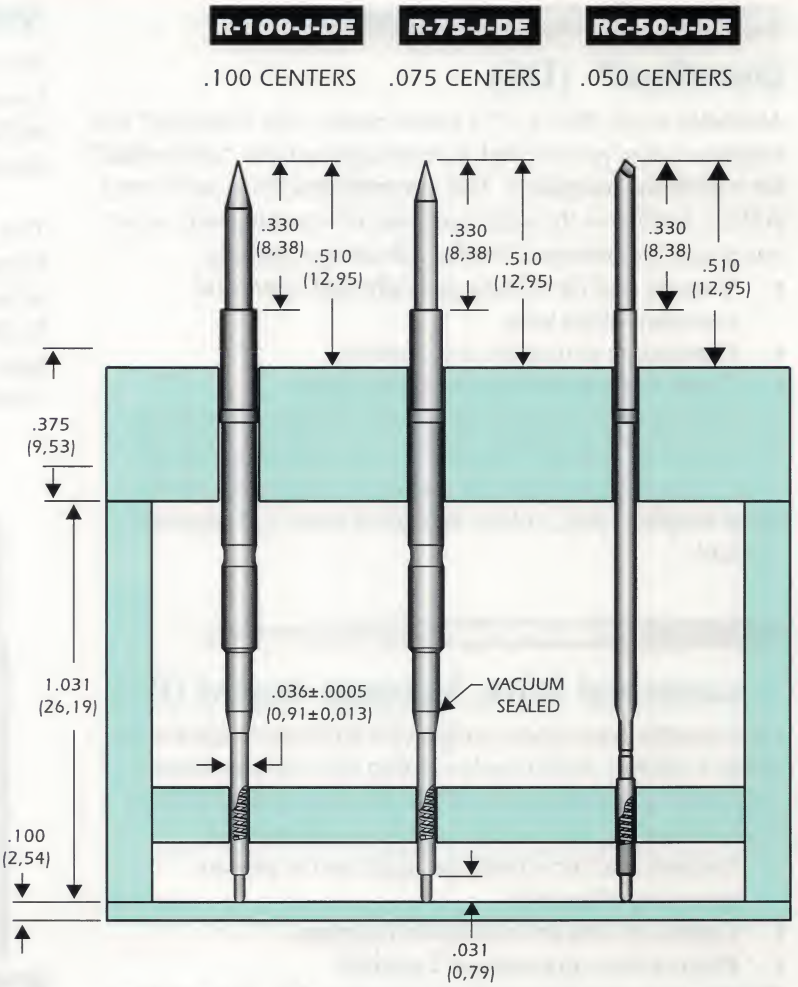


Double-Ended Receptacles for Wireless Fixturing

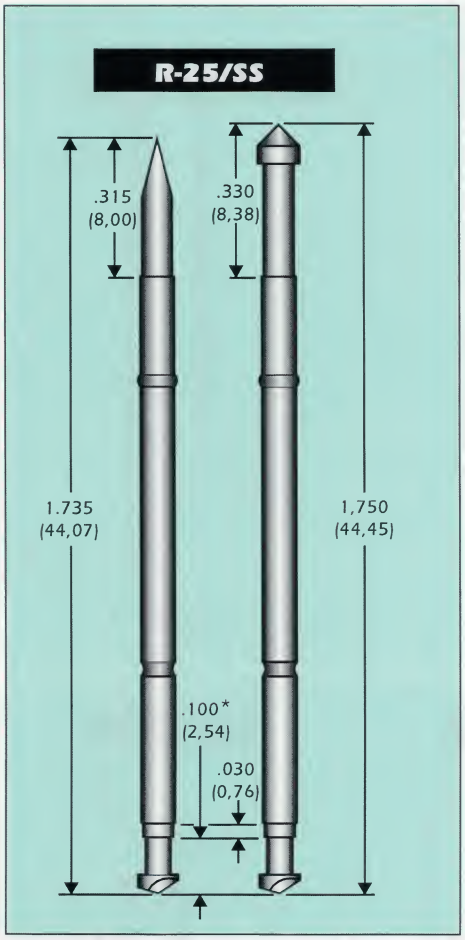
Until recently, when signal integrity was critical, twisted pair wiring was used to reduce inductance and capacitance loading. In the last few years the popularity of wireless test fixtures for twisted pair wiring has increased. The average fixture has between 2 to 2.5 feet of wire per node. In wireless test fixtures, the wire has been replaced by a trace with an average length of 1" to 1.5". This results in significantly better signal quality by reducing the inductance and capacitance loading. IDI offers three series of double-ended receptacles for wireless fixturing.

The double-ended receptacles shown, feature a bottom nonreplaceable probe and a replaceable top probe on .100" (2,54), .075" (1,91) or .050" (1,27) centers.

- The nonreplaceable probe has four (4) plunger options:
  - B – 30° Spear
  - J – Spherical Radius
  - S – 60° Headless Chisel
  - U – 4 Point Crown
- Spring force on nonreplaceable probe:
  - 2.7 oz. (77 gm) at .069" (1,75) travel for R-100 and R-75
  - 3.4 oz. (97 gm) at .069" (1,75) travel for RC-50
- Replaceable probe:
  - Size 25 or ICT-100 probe for .100" (2,54) centers
  - Size SL1 or ICT-75 probe for .075" (1,91) centers
  - Size SC0 or ICT-50C probe for .050" (1,27) centers



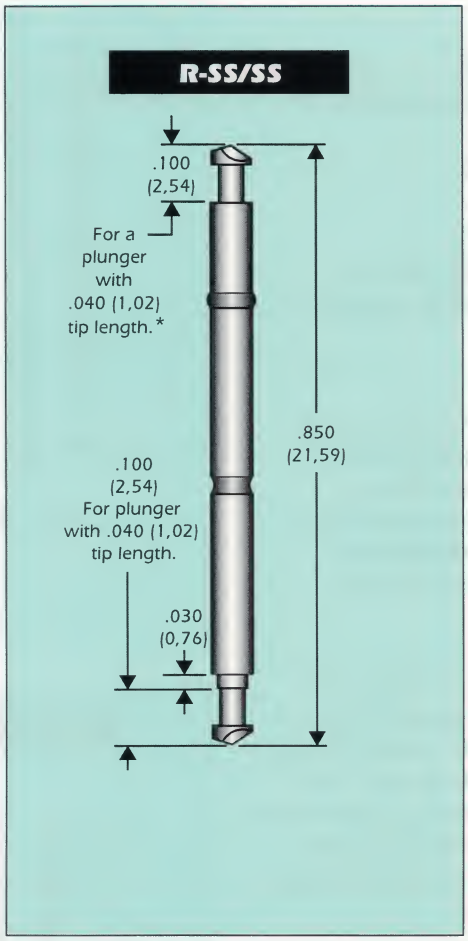
R-25/SS Double-Ended Receptacle



The R-25/SS features replaceable probes on both ends. The R-25/SS receptacle houses a Size 25 or ICT-100 probe and an SS-100 or GSS-100 probe. The extension of the Size 25 or ICT-100 probe from the top of the receptacle is .330" (8,38) for headed probes and .315" (8,00) for headless probes. The extension of the SS-100 or GSS-100 will vary based on tip length.

* For SS-100 or GSS-100 probe with .040" (1,02) tip length.

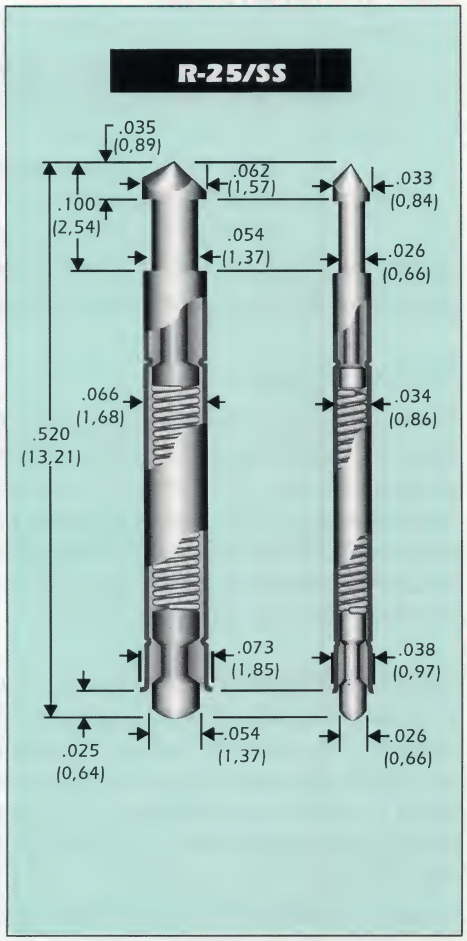
R-SS/SS Double-Ended Receptacle



The R-SS/SS houses a replaceable SS-100 or a GSS-100 probe on both ends of the receptacle. The extension of the SS-100 or GSS-100 will vary based on tip length.

* For SS-100 or GSS-100 probe with .040" (1,02) tip length.
* Headed plunger required on this end.

DE-100 & DE-50 Double-Ended Probe



The DE-100 and DE-50 are ideal for high performance test applications due to the probe's short signal path. The DE-100 and DE-50 probes feature a chisel point on the top-side and a spherical radius on the bottom side of the assembly.

- Available in .100" (2,54) and .050" (1,27) centers.
- Maximum travel is .080" (2,03).
- Minimum compressed height .440" (11,18).
- Consult factory for alternate tip style options.

For applications requiring ultra-close, center-to-center parameters, IDI has pioneered the way toward satisfying those specifications. IDI offers the following probes for testing on or below .030" (0,76) centers:

Penta 0 – .010" (0,25) centers
.015" (0,38) with receptacle
Quad 00 – .020" (0,51) centers with receptacles
Quad 0 – .020" (0,51) centers
.025" (0,64) with receptacle
Tri 0 – .025" (0,64) centers
.030" (0,76) with receptacle

The Penta 0, Quad 0, and Tri 0 are available with wire attached or may be used with the corresponding receptacle.

Wire Types

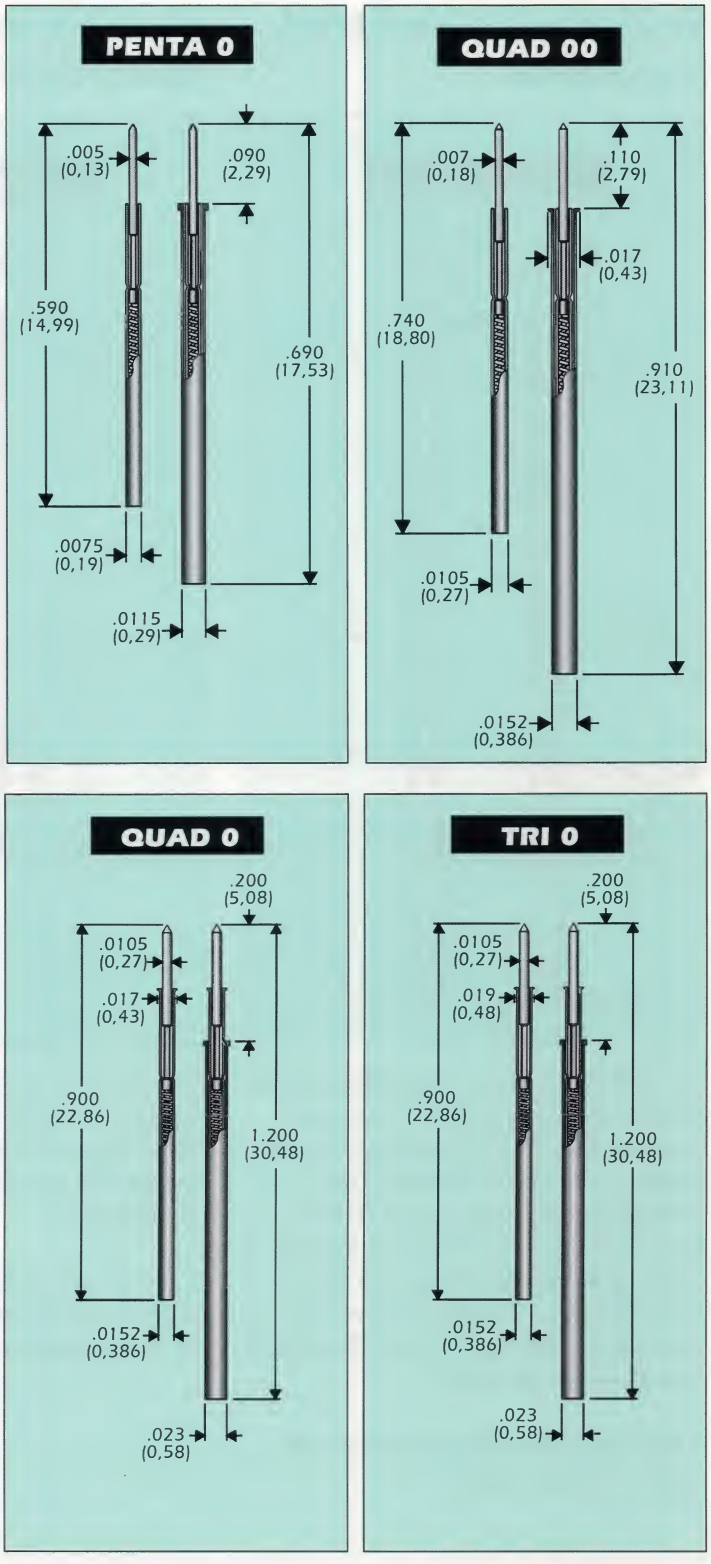
When using any of the Microseries probes without a receptacle, it is recommended that the probe be ordered with a preattached wire. All Microseries probe assemblies use soderex magnet wire. Soderex magnet wire is a resistance wire with a desirable thin insulation (polyurethane base insulation enamel). It can be stripped by one of several methods: abrasion, chemical or heat.

The Tri 0 and Quad 0 probes have a 30 gage soderex wire preattached and the Penta 0 probe has a 36 gage soderex magnet wire. If the Microseries probes are to be used with a receptacle, the probe should be ordered without wire. The Tri 0 and Quad 0 receptacle have a 26 gage soderex magnet wire preattached and the Penta 0 has a 33 gage soderex magnet wire. Standard wire length is 36" with a 1" strip. Specialized lengths and strips are available upon request.

Fixturing

Fixturing of the Microseries probes is critical to their performance. Drill hole diameter and drill hole straightness are the two most important factors. To show the significance of accurate fixturing consider the following. An average sheet of notebook paper is approximately .003" thick. The outside barrel diameter of the Tri 0 and the Quad 0 is .0152", the inside diameter is approximately .012". This makes the wall thickness .0016" [(.0152-.012)/2]. The wall thickness is one half the thickness of a sheet of paper! Just imagine what the wall thickness of the Penta 0 must be when the outside diameter is .0075!

See the following page for recommended fixturing options.

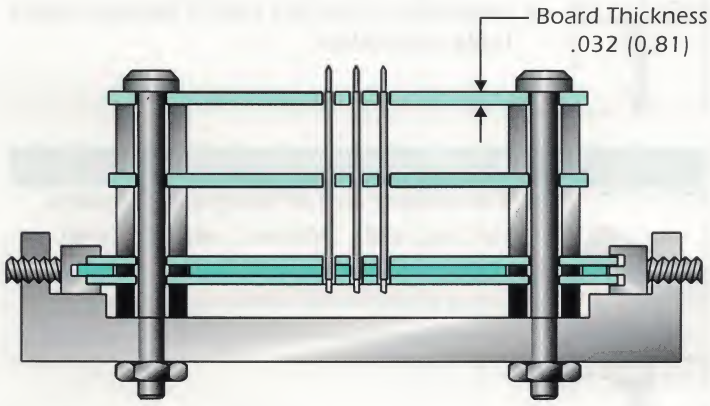


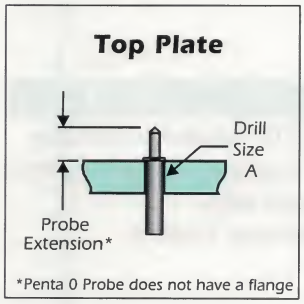
MicroSeries Fixturing – Penta 0

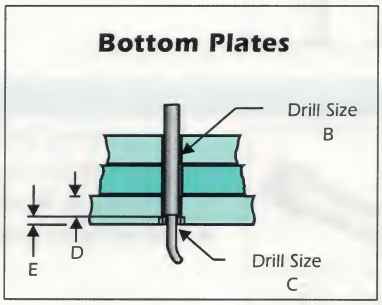
This method features stepped holes to retain the Penta 0 probe in the fixture and a shear plate, which forces the probes to one side, providing sufficient friction to retain the probes.

Since the Penta 0 Receptacle does not have a flange on the top of the receptacle, the stepped holes are required to retain the receptacle.

	Penta 0 Probe	Penta 0 Receptacle
Drill Size A	#91 - .0083 (0,21)	0,32mm - .0126 (0,32)
Drill Size B	#91 - .0083 (0,21)	0,30mm - .0118 (0,30)
Drill Size C	#95 - .0067 (0,17)	NA
Dimension D	.022 (0,56)	NA
Dimension E	.010 (0,25)	NA







Probe Extension

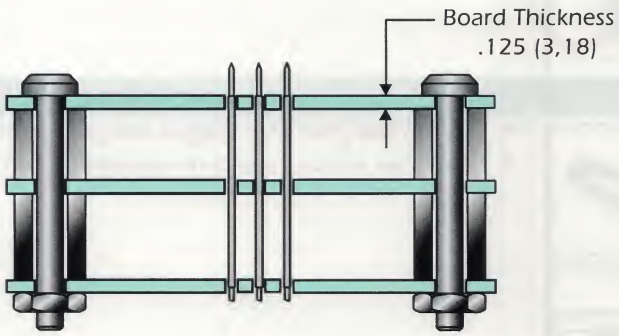
Penta 0—.090 (2,29)
Penta 0 with Receptacle—.102 (2,59)

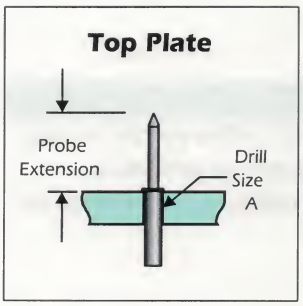
MicroSeries Fixturing – Quad 00, Quad 0 & Tri 0

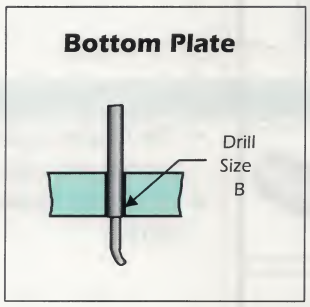
The Quad 0 and Tri 0 probes have a flange at the top of the barrel for a stop. The Quad 00 probe must be used with a receptacle. Its receptacle also has a flange for a stop, as well as the Quad 0 and Tri 0 Receptacle.

An optional shear plate may be used to force the probes and receptacles to one side, providing enough friction to retain the probes in the fixture.

	Drill Size A	Drill Size B
Quad 00 Receptacle	#78 - .016 (0,41)	0,45mm - .0177 (0,45)
Quad 0 Probe	#78 - .016 (0,41)	0,45mm - .0177 (0,45)
Quad 0 Receptacle	#72 - .025 (0,64)	0,70mm - .0276 (0,70)
Tri 0 Probe	#78 - .016 (0,41)	0,45mm - .0177 (0,45)
Tri 0 Receptacle	#72 - .025 (0,64)	0,70mm - .0276 (0,70)





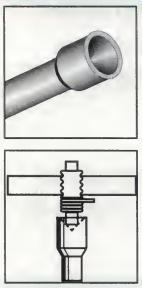


Probe Extension

Quad 00—.110 (2,79)
Quad 0 & Tri 0 Probe—.110 (2,79)
Quad 0 & Tri 0 with Receptacle—.210 (5,33)

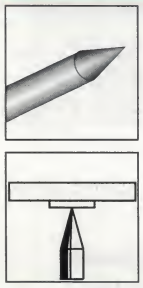
Plunger Tip Styles and Usages

"A" Tip – 90° Concave



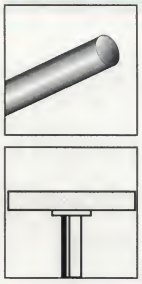
- The headed concave tip used to test long leads, terminals, and wire wrap posts.
- Contamination and debris can be trapped in the concave area resulting in false failures.

"B" Tip – 30° Spear Point STEEL OPTION



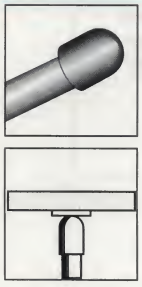
- Used to test lands, pads, and plated through holes.
- At low spring forces, the spear point is ideal for penetrating thin layers of oxides or contaminants. Higher spring forces can be used for thicker layers.

"C" Tip – Flat



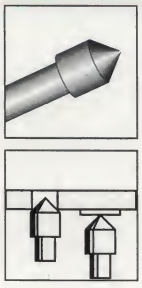
- Used to test gold edge fingers and gold pads.
- Leaves no witness marks or indentations on UUT.

"D" Tip – Spherical Radius



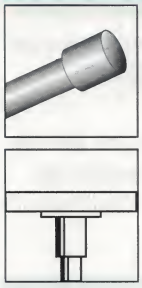
- The headed spherical radius tip can be used to test gold edge fingers or gold pads.
- Leaves no witness marks or indentations on UUT.

"E" Tip – 90° Convex



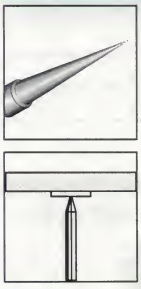
- The headed cone shaped tip is used to test plated through holes, pads, and lands.
- The smooth cone shaped head allows plated through holes to be tested with minimal witness marks to UUT.
- The point of the tip is used to test pads and lands.

"F" Tip – Flat



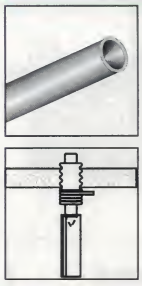
- The headed flat tip can be used to test gold edge fingers and gold pads.
- Leaves no witness marks or indentations on UUT.

"FX" Tip – Flexible Spear STEEL OPTION



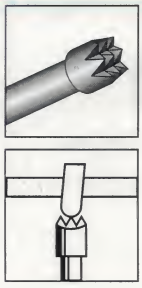
- The sharp spear tip is ideal for penetrating conformal coatings, solder masks, and contaminants on pads and filled vias.
- The plunger is made of steel for long life and resilience.
- Available in Size SL1 and 25 Spring Contact Probe assemblies.

"G" Tip – Concave



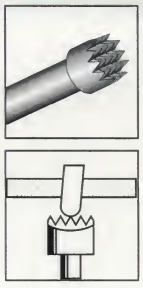
- The concave area of the tip can be used to test long leads, terminals, and wire wrap posts.
- Contamination and debris can be trapped in the concave area resulting in false failures.

"H" Tip – Serrated STEEL OPTION



- The grooved area of the headed serrated tip can be used to test long leads, terminals, wire wrap posts, lands, and pads.
- The serrated grid features 9 points.

"HL" Tip – 21 Point Serrated



- The oversized serrated head allows reliable contact with mispositioned targets such as leads and connector terminals.
- When used for large pads, the large contact area with multiple current paths provides low resistance.
- Available in Size 25 and 5 Spring Contact Probe assemblies.

"HT" Tip – 9-Point Tapered Serrated


- The small contact diameter of .025" (0,64) allows testing of small pads and short leads.
- Tapered plunger shaft allows the probe to pass close to board components.
- Multiple contact points provide great stability, minimal marking, and low resistance.
- Available in Size 25 Spring Contact Probe assemblies.

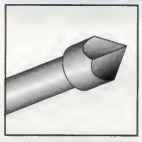
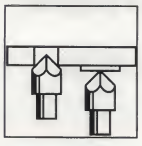
"H4T" Tip – 4-Point Tapered Serrated


- The small contact diameter of .023 (0,58) allows testing of small pads and short leads.
- Tapered plunger shaft allows the probe to pass close to board components.
- Fewer points than the "HT" tip for more spring force per point for more penetration.
- Available in Size 25 Spring Contact Probe assemblies.

"J" Tip – Spherical Radius

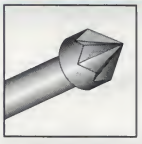

- Used to test gold edge fingers and gold pads.
- Leaves no witness marks or indentations on UUT.

"K" Tip - 45° 4-Sided Chisel

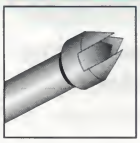
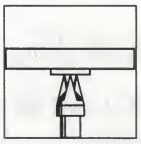
- The 4-Sided 45° Chisel can be used to test plated through holes, pads, and lands.
- The four sharp edges of the chisel cut through the oxides and contaminants in the plated through hole.
- The tip of the chisel contacts the lands and pads.

"LM" Tip - 90° Star



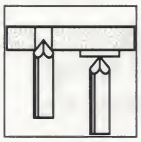

- Used to test plated through holes, lands, and pads.
- The six sharp edges wipe oxides and contaminants in the plated through holes.
- The tip contacts the lands and pads.
- When used with the ROTATOR™ Spring Contact Probe, the head cuts through oxides and contaminants.

"NT" Tip – Needle Teeth STEEL OPTION

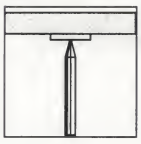
- Appropriate for pads, and short leads.
- Sharp teeth cut through contaminants.
- Geometry optimized for strength and stability.
- Available in Size 25 Spring Contact Probe assemblies.

"S" Tip - 60° Chisel STEEL OPTION

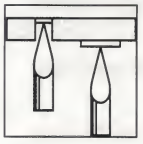
- The Headless 60° Chisel can be used to test plated through holes, pads, and lands.
- The sharp edges of the chisel cut through the oxides and contaminants in the plated through hole.
- The tip of the chisel contacts the lands and pads.

"SN" Tip – Single Needle STEEL OPTION

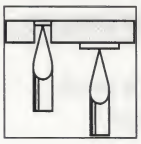
- The Single Needle is appropriate for pads and filled vias.
- Precision ground to extreme sharpness from a special alloy for high resiliency and strength.
- IDI's strongest tip style for piercing contaminants, solder masks, and conformal coatings.
- Available in Size 25 Spring Contact Probe assemblies.

"SP" Tip – Chiseled Spear STEEL OPTION

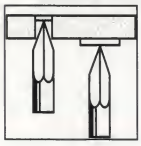
- The sharp chiseled spear penetrates contaminants, solder masks, and conformal coatings on pads, filled vias, and unfilled vias.
- The knife-like edges contact the contaminated rim of the unfilled via.
- Available in Size 25, SL1, SJ0, SC0, and all ICT Spring Contact Probe assemblies.

"SPB" Tip – Blunt Chiseled Spear STEEL OPTION

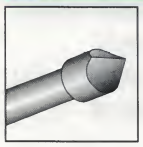
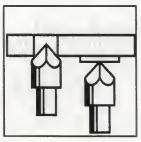
- The blunt chiseled spear penetrates contaminants, solder masks, and conformal coatings on pads, filled vias, and unfilled vias.
- The blunter tip provides good penetration but does not stick in unfilled vias.
- The knife-like edges contact the contaminated rim of the unfilled via.
- Available in Size 25 Spring Contact Probe assemblies.

"SW" Tip – 4-Sided Arrow Head STEEL OPTION

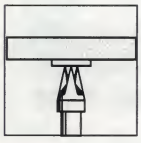
- The 4-sided arrow head penetrates contaminants, solder masks, and conformal coatings on pads, filled vias, and unfilled vias.
- The knife-like edges contact the contaminated rim of the unfilled via.
- The wide angle of two of the edges prevent sticking in unfilled vias.
- Available in Size 25, SL1, SJ0, SC0, and all ICT Spring Contact Probe assemblies.

"T" Tip - 60° Chisel STEEL OPTION

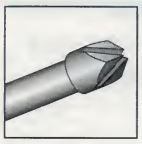
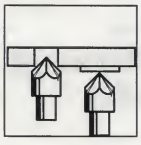
- The headed 60° chisel can be used to test plated through holes, lands, and pads.
- The sharp edges of the chisel cut through the oxides and contaminants in the plated through hole.
- The tip contacts the lands and pads.
- When used with the ROTATOR™ Spring Contact Probe, the head cuts through contaminants.

"TN" Tip – Tri-Needle STEEL OPTION

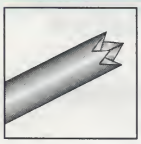
- The Tri-Needle tip can be used to test contaminated targets or pierce conformal coatings on leads and pads.
- The three extremely durable music wire tips resist bending.
- Available in Size 25 Spring Contact Probe assemblies.

NEW "TX" Tip – 3-Point Chiseled Crown

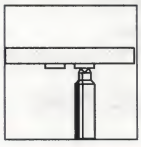
- A very versatile tip that can be used to test plated through holes, lands, and pads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- Penetrates contaminants and coatings on pads, filled vias, and unfilled vias.
- The edges of the gradual taper are used for testing plated through holes.
- The three points contact the pads and lands.
- Available in Size 25, ICT-100, ICT-75, and SL1, Spring Contact Probe assemblies.

"U" Tip – 4-Point Crown STEEL OPTION




- Used to test lands, pads, and leads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- The inside edges of the tip trap the leads to make contact.
- The four points contact the pads or lands.
- Similar to the W or V tip styles, but headless.

"UR" Tip – Reduced 4-Point Crown STEEL OPTION

- The reduced 4-point crown diameter allows contact with smaller targets, such as small pads and filled vias.
- Multiple points of the tip provide stability and low contact resistance.
- Available in Size 25, SL1, SJ0, SC0, and ICT Series Spring Contact Probe assemblies.

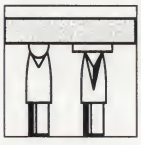
"UST" Tip – 4-Point Tapered Crown STEEL OPTION


- The reduced 4-point crown diameter allows contact with smaller targets, such as small pads and filled vias.
- The tapered tip shape allows the probe to pass close to board components.
- Available in Size 25 and SL1 Spring Contact Probe assemblies.

"UT" Tip – 4-Point Tapered Crown

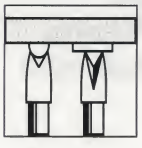

- The reduced 4-point crown diameter allows contact with smaller targets, such as small pads and filled vias.
- The tapered tip shape allows the probe to pass close to board components.
- Available in Size 25, 0 and SS-30 Spring Contact Probe assemblies.

"V" Tip – 4-Point Crown

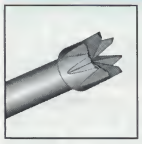
- The headed 4-point crown can be used to test lands, pads, and leads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- The inside edges of the tip trap the leads to make contact.
- The four points contact the pads or lands.

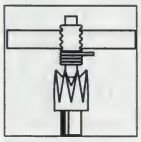
"VT" Tip – 4-Point Crown STEEL OPTION

- The headed 4-point crown can be used to test lands, pads, and leads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- The inside edges of the tip trap the leads to make contact.
- The four points contact the pads or lands.

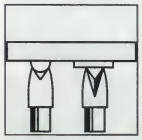
"V8" Tip – 8-Point Crown





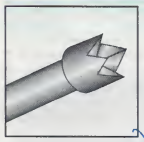
- Appropriate for long leads, connector terminals, and round pads or solder fillets.
- Self-cleaning design allows contaminants to fall clear.
- Large tip radius captures long leads and connector terminals.
- Available in Size SL1 Spring Contact Probe assemblies.

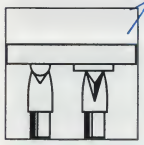
"W" Tip – 4-Point Crown STEEL OPTION



- The headed 4-point crown can be used to test lands, pads, and leads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- The inside edges of the tip trap the leads to make contact.
- The four points contact the pads or lands.

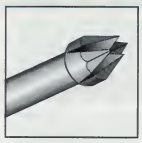
"WO" Tip – 4-Point Crown STEEL OPTION

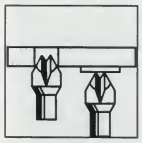




- The headed 4-point crown can be used to test pads and leads.
- Non-self cleaning design is more stable on misaligned leads and connector terminals.
- The four points allow stable, low resistance contact with pads.
- Available in the standard and ICT Series Size 25 Spring Contact Probe assemblies.

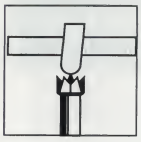
"X" Tip – 4-Point Tapered Crown





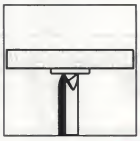
- A very versatile tip that can be used to test plated through holes, leads, lands, and pads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- The edges of the gradual taper are used for testing plated through holes.
- The four points contact the pads and lands.
- The inside edges trap the leads.

"Y" Tip – Tulip (Steel Option) STEEL OPTION



- Used to test long leads, terminals, and wire wrap posts.
- The head is cut to allow contaminants to easily fall-out; self-cleaning.
- The inside edges trap the leads.

"Z" Tip – 3-Point Crown STEEL OPTION

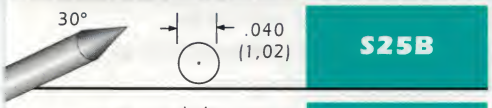
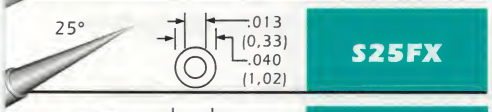
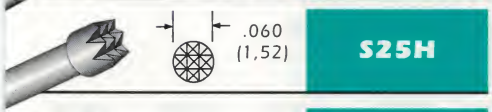
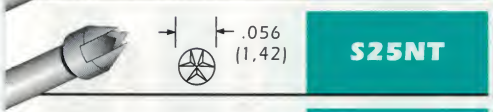
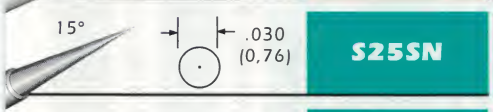
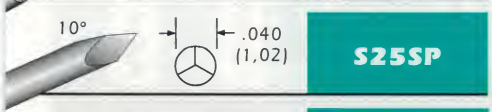
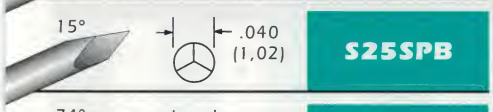
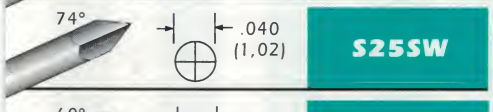
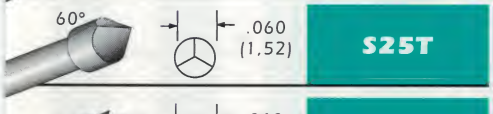
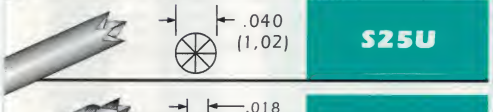
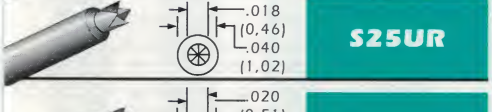
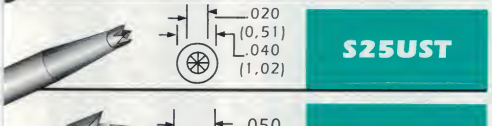
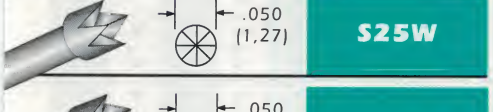
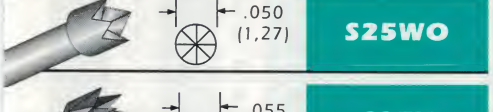
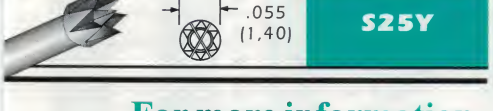


- Used to test lands, pads, and leads.
- The head is cut to allow contaminants to easily fall out; self-cleaning tip.
- The inside edges of the tip trap the leads to make contact.
- The three points contact the pads or lands.
- Similar to the U tip style.

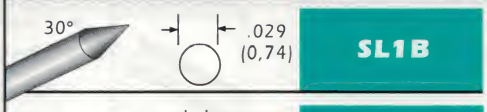
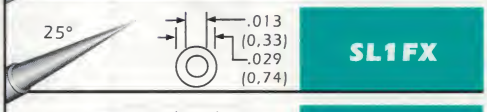
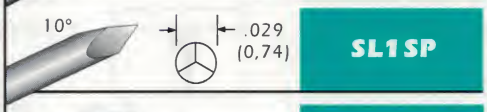
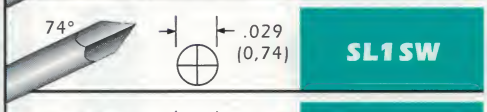
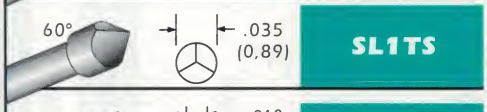
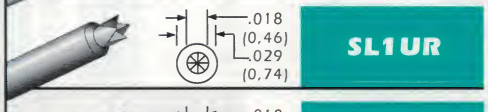
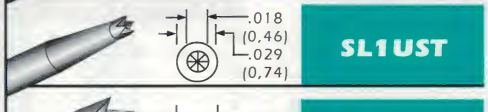
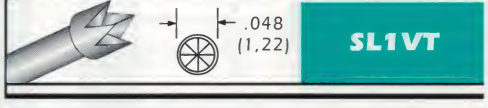
Tip Style	Self Cleaning	Long Leads	Terminals	Wire Wrap Posts	Pads	Filled Vias	Unfilled Vias	Contaminated Boards	Conformal Coatings	Plated Through Holes	Minimal Witness Marks
PLUNGER TIP STYLES											
A		•	•	•							•
B	•				•	•		•	•		
C					•						•
D					•						•
E	•				•					•	•
F					•						•
FX	•				•	•	•	•	•		
G		•	•	•							•
H		•	•	•	•	•					
HL		•	•	•	•						
HT					•	•					•
H4T					•	•					•
J					•						•
K	•				•	•	•	•		•	
LM	•				•	•	•	•		•	
NT	•	•	•	•	•	•	•	•			
S	•				•	•	•	•		•	
SN	•				•	•	•	•	•		
SP	•				•	•	•	•	•	•	
SPB	•				•	•	•	•	•	•	
SW	•				•	•	•	•	•	•	
T	•				•	•	•	•		•	
TN	•	•	•	•	•	•		•	•		
TX	•				•	•	•	•			
U	•	•	•	•	•	•		•			
UR	•				•	•	•	•			
UST	•				•	•	•	•			
UT	•				•	•	•				
V	•	•	•	•	•			•			
VT	•	•	•	•	•			•			
V8	•	•	•	•	•						
W	•	•	•	•	•			•			
WO		•	•	•	•			•			
X	•	•	•	•	•	•	•	•			
Y	•	•	•	•	•	•	•	•			
Z	•	•	•	•	•	•	•	•			

Steel Plungers

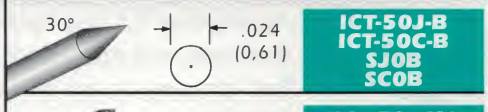
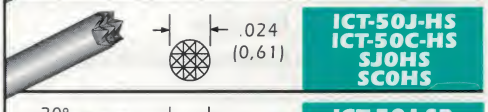
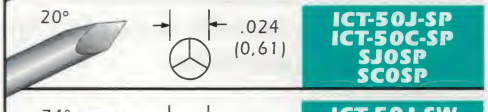
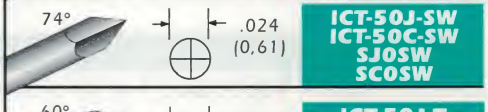
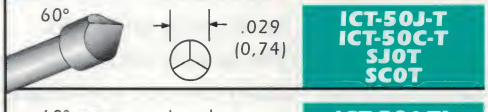
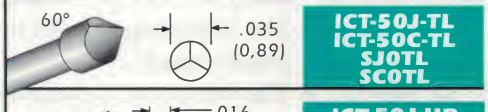
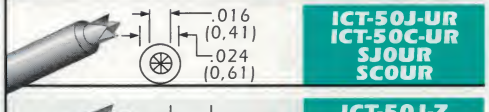
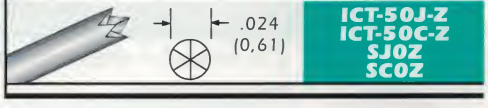
Size 25 .100 (2,54) centers

	S25B
	S25FX
	S25H
	S25NT
	S25SN
	S25SP
	S25SPB
	S25SW
	S25T
	S25U
	S25UR
	S25UST
	S25W
	S25WO
	S25Y

Size SL1 .075 (1,91) centers

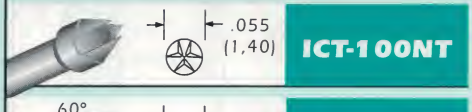
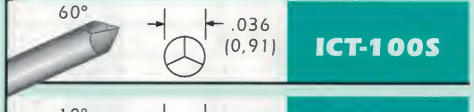
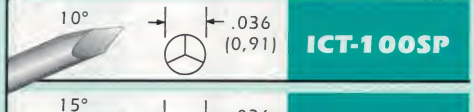
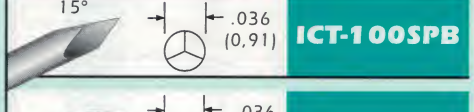
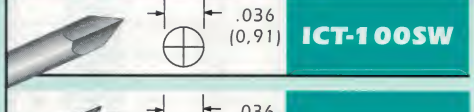
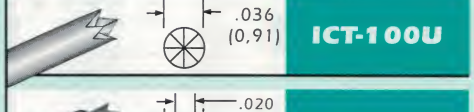
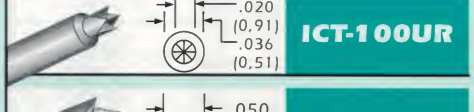
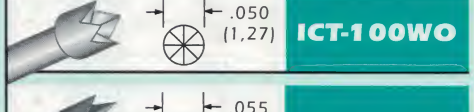
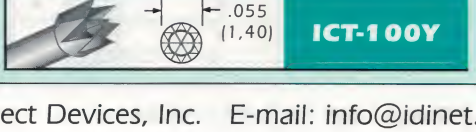
	SL1B
	SL1FX
	SL1SP
	SL1SW
	SL1TS
	SL1UR
	SL1UST
	SL1VT

ICT-50J & ICT-50C
Size SJ0 & SC0 .050 (1,27) centers

	ICT-50J-B ICT-50C-B SJ0B SC0B
	ICT-50J-HS ICT-50C-HS SJ0HS SC0HS
	ICT-50J-SP ICT-50C-SP SJ0SP SC0SP
	ICT-50J-SW ICT-50C-SW SJ0SW SC0SW
	ICT-50J-T ICT-50C-T SJ0T SC0T
	ICT-50J-TL ICT-50C-TL SJ0TL SC0TL
	ICT-50J-UR ICT-50C-UR SJ0UR SC0UR
	ICT-50J-Z ICT-50C-Z SJ0Z SC0Z

ICT™ Steel Plungers

ICT-100

	ICT-100NT
	ICT-100S
	ICT-100SP
	ICT-100SPB
	ICT-100SW
	ICT-100U
	ICT-100UR
	ICT-100WO
	ICT-100Y

ICT-075

	ICT-075NT
	ICT-075S
	ICT-075SP
	ICT-075SW
	ICT-075U
	ICT-075UR
	ICT-075VT
	ICT-075Y

ICT-50J & ICT-50C are shown above.

For more information

Cleaning Procedure

In general, IDI does not recommend cleaning probes. However, there are circumstances where cleaning probes is necessary. Listed below are five options for cleaning probes.

Option 1

1. Spray probes in fixture with DeoxIT D5 Spray manufactured by Caig Laboratories,
   phone: (858) 486-8388
   fax: (858) 486-8398
   e-mail: caig123@aol.com
   web: www.caig.com
2. Lightly brush tips with a nylon bristle brush.
3. Rinse with an odorless petroleum naphtha or isopropyl alcohol (99.9%).
4. Lightly spray probes with DeoxIT D5 to protect and relubricate the probes.

This method does not use any ozone depleting chemicals. The DeoxIT D5 spray has ozone safe propellants and a petroleum naphtha solvent.

Option 2

1. Mix DeoxIT D100L (100% pure) in a high grade of isopropyl alcohol, 5 parts per 100.
2. Shake well. The DeoxIT liquid is an oil base and the isopropyl alcohol is a water base. The solution will separate if not shaken frequently.
3. Lightly spray probe tips with the solution.
4. Brush the tips with a nylon bristle brush.
5. Rinse with the isopropyl alcohol.
6. Lightly spray with the solution to protect and relubricate the probes.

This method does not use any ozone depleting chemicals.

Option 3

1. Dip a nylon bristle brush in DeoxIT D100L Liquid (100% pure).
2. Brush plunger tips. Repeat process until all tips have been cleaned.
3. Rinse with isopropyl alcohol.
4. Lightly brush probes with the DeoxIT (D5L) Liquid to protect and relubricate.

This method does not use any ozone depleting chemicals.

Option 4

1. Remove probes from fixture.
2. Rinse in isopropyl alcohol for thirty seconds maximum.
3. Install probes in fixture.
4. Spray lightly with the DeoxIT D5 Spray.

This method does not use any ozone depleting chemicals.

Option 5

1. Use pressurized air to remove the contaminates.

This method is effective only if the contaminates are loose particles.

Fluxbusters™

IDI Fluxbusters are a series of probes specifically designed to penetrate heavy oxide layers, contaminants, flux and conformal coatings. The table below briefly describes the available probes in the Fluxbusters Series:

Name	Centers	Max. Stroke	Catalog Page	Comments
Rotator™				
Size 25	.100 (2,54)	.220 (5,59)	50	Rotates 90° @ .170" (4,32) travel
Size SL1	.075 (1,91)	.225 (5,72)	51	Rotates 90° @ .170" (4,32) travel
Size SJ0	.050 (1,27)	.250 (6,35)	52	Rotates 85° @ .170" (4,32) travel
Size SC0	.050 (1,27)	.250 (6,35)	53	Rotates 85° @ .170" (4,32) travel
Steel Plungers				
Size 25	.100 (2,54)	.250 (6,35)	34	Fifteen Steel Plunger Options
Size SL1	.075 (1,91)	.250 (6,35)	28	Eight Steel Plunger Options
Size SJ0	.050 (1,27)	.250 (6,35)	22	Eight Steel Plunger Options
Size SC0	.050 (1,27)	.250 (6,35)	24	Eight Steel Plunger Options
Aggressive Springs				
Size 25	.100 (2,54)	.250 (6,35)	34	8 & 10 oz. @ .170" (4,32) travel
Size 2	.100 (2,54)	.160 (4,06)	32	8 & 10 oz. @ .100" (4,32) travel
Size SL1	.075 (1,91)	.250 (6,35)	28	6.6 oz. @ .170" (4,32) travel
Size SJ0	.050 (1,27)	.250 (6,35)	22	7 & 10 oz. @ .170" (4,32) travel
Tri-Needle	.100 (2,54)	.260 (6,60)	43	8 & 10 oz. @ .170" (4,32) travel
ICT™ Series				
ICT-100	.100 (2,54)	.250 (6,35)	44	8, 10 & 17 oz. @ .170" (4,32) travel
ICT-075	.075 (1,91)	.250 (6,35)	45	7 & 10 oz. @ .170" (4,32) travel
ICT-50J	.050 (1,27)	.250 (6,35)	46	7 & 10 oz. @ .170" (4,32) travel
ICT-50C	.050 (1,27)	.250 (6,35)	47	5.4 oz. @ .170" (4,32) travel

Selection of Fluxbusters

Choosing an effective Fluxbuster is a process that should be based on factual information and experience. Some test engineers have found that progress can be made quickly by starting with the most effective possible probe for a given target and contamination type. Because the most effective Fluxbusters are more expensive than their standard counterparts, other test engineers start with more standard probe styles. The chart below rates Fluxbusters in terms of their effectiveness as reported by many customers, versus the appropriate contamination level, and test target.

Series	Leads	Pads	Filled Vias	Unfilled Vias	Flux Residue	Conformal Coatings and Solder Masks	OSP Coatings
Rotators	N/A	10	9	N/A	Excellent	Excellent	Excellent
Tri-Needle (TN)	10	7	3	N/A	Excellent	Excellent	Superior
Single Needle (SN)	N/A	8	6	N/A	Excellent	Excellent	Superior
Needle Teeth (NT)	7	9	2	1	Excellent	Good	Good
Chiseled Spear (SP/SPB)	N/A	9	7	7	Excellent	Superior	Excellent
Arrowhead Spear (SW)	N/A	9	8	8	Excellent	Superior	Good
Tapered Crown (UST/UR)	N/A	8	8	8	Superior	Good	Good
Steel Plungers with high spring forces	6	6	6	6	Superior	Superior	Good
Be Cu Plungers with high spring forces	3	3	3	3	Good	Fair	Good

* Rated from 0 to 10, with 10 being optimal

Rotators™

IDI is the inventor of the rotating Spring Contact Probe. This type of probe features a tip which rotates 85° - 90° at the probe's rated travel. This allows the probe to clear away contaminates like a drill, facilitating contact with the Unit Under Test (UUT). IDI's patented Rotator probe is the most aggressive and effective Fluxbuster offered by IDI.

To drive the probe's rotation, a helical section built into the minor diameter of the plunger engages a special crimp at the midsection of the probe. IDI's SX Crimp is applied to the top of the barrel to help seal out contaminants that fall from the UUT during probe actuation. In addition, the tips of the Rotators are specifically designed to be larger than the barrel diameter, to provide an umbrella effect against contamination.

The plunger plating on the Rotators is a proprietary plating process called Duralloy™. Duralloy is comparable in hardness to rhodium (1000 Knoop) but lacks the microcracks commonly found in electro-deposited rhodium. The hardness and wear characteristics of the plunger plating are critical to the Rotator design and performance. Due to the aggressive nature of the rotating action, a hard gold electro-deposit (180 Knoop) is not suitable in this design.

The unique plating and lubrication process makes the tremendous friction inherent in the rotation mechanism survivable. While IDI rates the mechanical life of its Rotators at only 100,000 to 250,000 test cycles, this far exceeds the number of test cycles most in-circuit probes are expected to survive. Because of their improved penetrating abilities, which do not rely as much as other techniques on tip sharpness, many customers find that Rotators offer a much longer effective cycle life than standard probes.

The unique twisting action of the Rotators allows the probe tip to penetrate through heavy contaminates and conformal coatings. The T and LM tips act similar to drill bits and penetrate through contaminates on test pads. These tips will leave marks or indentations in the test pads.

One of the chief advantages of the Rotator is that it derives its penetrating ability from its mechanical action, thus very high spring forces are not required, allowing high density vacuum fixtures to be cycled reliably. Although the Rotator probe is available in all standard spring force options, IDI recommends a medium to moderately low spring force (3 to 7 oz.) when using Rotator probes.

Rotators are most effective on pads and vias. IDI does not currently offer a tip style suitable for leads. The Rotator is effective on both hard and soft flux residues, and many believe that it is the best choice for OSP problems.

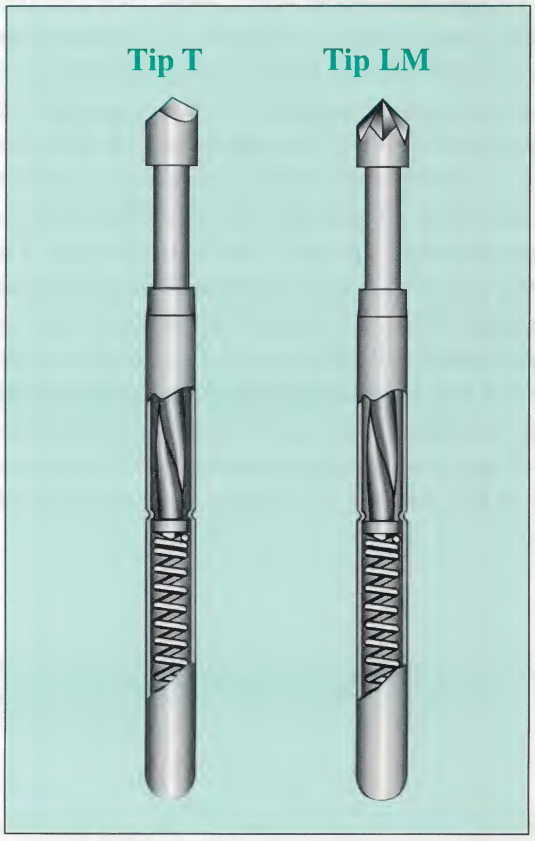
The Rotator product line has been expanded to include two .050" (1,27) center designs (page 52 and 53) along with the .075" (1,91) centers (page 51) and .100" (2,54) centers (page 50) previously available. All Rotator probes are dimensionally equivalent to their standard counterparts:
Size 25 - .100" (2,54) centers, Size SL1 - .075" (1,91) centers, Size SC0 - .050" (1,27) centers, and Size SJ0 - .050" (1,27) centers.

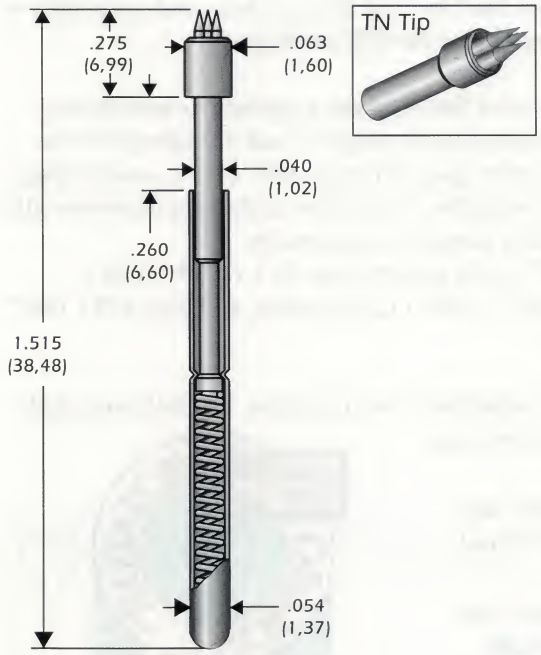
The Rotator is available in two tip styles. The following table details tip styles by size.

Size 25
LM–90° Star
T–60° Chisel

Size SL1
LM–90° Star

Size SC0 & SJ0
T–60° Chisel





Tri-Needle Probe

The Tri-Needle (TN) is tremendously effective as a Fluxbuster for leads. The TN tip takes advantage of the unique properties of music wire. Music wire is extremely tough high carbon steel; so tough that it cannot be profiled in the way BeCu or tool steel are to form plungers. IDI solves this by making a hollow probe plunger and crimping in three pieces of music wire precision ground to needle sharpness. The tips will maintain sharpness significantly longer than other spear point style tips. These three needles form a crown, with tips .025" (0,64) in diameter. This tip is extremely effective at making contact with misaligned and contaminated leads. The head of the probe is very wear resistant to sideloading. Because of its unique construction, the TN has a greater head height than standard probes, and this requires that receptacles be mounted at a different height if used with standard probes. The TN tip is available in Size 25 for .100" (2,54) centers, page 34 of the catalog.

The "Dirty Truth" About Fluxbusters™

The Fluxbusters evolved in concert with laws restricting the use of ozone depleting chemicals. These chemicals had been used to clean printed circuit boards of flux residues which remained after the soldering process. In their absence, the nonconductive flux residue was more difficult to remove and caused increased problems in making contact with the board during the test process.

Production engineers are typically able to reduce these problems through strict process control and experimentation with various solders, fluxes, and cleaning methods. However, this is an empirical process unique to each board, and there is often a transitional period where contamination is unavoidable. As a result, test engineers are often left with test points coated in either soft, gummy residue, or hardened, varnish-like residue. In addition, test engineers forced to make contact through slipped solder masks or conformal coatings face similar issues concerning the increased need for penetration.

Recently, attempts by PCB manufacturers to supplant Hot Air Solder Leveling (HASL) with other solderability protection technologies has presented test engineers with an additional issue: Organic Solder-ability Protectant (OSP) coatings. OSP is a coating used to protect the solderabilty of bare copper. It is displaced from lands and PTHs during the soldering process, but unfilled vias and unsoldered test pads are left coated with a thin, hard residue which is very difficult to test through. This has created a test scenario that is often more difficult to solve than flux contamination related problems.

Steel Plungers

With the introduction of no-clean technology, the tip and edge life of plunger tips have become much more critical to successful penetration of contaminates, resulting in the introduction of steel plungers into the market.

The steel plungers have a hardness of 50-55 on a Rockwell C scale compared to 36-42 for beryllium copper plungers. The steel plungers have a slightly higher resistance than their beryllium copper counterparts, approximately 3 milliohms for a Size 25 plunger.

IDI has expanded the steel plunger product line to include several options for testing on .100" (2,54) centers, .075" (1,91) centers and .050" (1,27) centers. For a description of all steel tips available refer to page 98 of the Source Book.

For more information on the metallurgical differences between beryllium copper and tool steel, see page 110 of the Source Book. For more information on tip application, see pages 94 to 97 of the Source Book.

Steel Plunger Tip Options by Size

Tip Style	Description	.100" Centers		.075" Centers		.050" Centers			
		ICT-100	Size 25	ICT-075	SLI	ICT-50J	SJ0	ICT-50C	SC0
B	Spear Point		•		•	•	•	•	•
FX	Flex Needle		•		•				
H	Serrated		•						
HS	Serrated					•	•	•	•
NT	Needle Teeth	•	•	•					
S	Chisel	•		•					
SN	Single Needle		•						
SP	Chiseled Spear	•	•	•	•	•	•	•	•
SPB	Chiseled Spear	•	•						
SW	Arrowhead	•	•	•	•	•	•	•	•
T	Chisel		•			•	•	•	•
TS	Chisel				•				
TL	Chisel					•	•	•	•
U	Crown	•	•	•					
UR	Reduced Crown	•	•	•	•	•	•	•	•
UST	Tapered Crown		•		•				
VT	Crown			•	•				
W	Crown		•						
WO	Crown	•	•						
Y	Tulip	•	•	•	•				
Z	Crown					•	•	•	•

ICT™ Series Probe

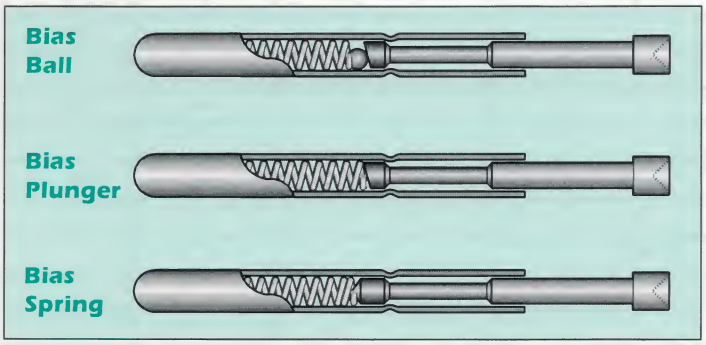
Titanium Pro ICT Series

The original patent pending ICT probe design was created to address the probe-related challenges of In-Circuit Testing. The introduction of the ICT probe series made available the first fundamentally new probe technology in 30 years, benefiting test personnel by surpassing performance levels obtainable from previous industry standard designs. The Titanium Pro ICT Series continues the evolution of high performance probe design by refining the ICT concept to achieve an even greater performance threshold. Previously unattainable results are realized through a stronger, more rugged design and platings designed to handle the harshness of today's In-Circuit Test environments.

Probe Design and Performance

Probe design is focused on ensuring internal contact between the plunger and barrel, attempting to prevent elevated and large variations in resistance caused by poor internal contact. This performance aspect is important because relatively small variations in resistance, voltage and/or current must be measured on the UUT during test. If the variation in the probe's resistance is greater than the allowable signal tolerance, a good product is rejected.

Until recently, to ensure a positive electrical contact, probes have been designed using a bias technology. These designs include, bias ball, bias plunger and bias spring. As with all bias technology, the goal of the design is to force the plunger off-center to ensure contact with the barrel. Obviously, this does not enhance pointing accuracy. It also forces the plunger to contact the barrel at a single point. The effect of the single track wear and the forced side loading is commonly noticed as a dark or black area on a single side of the plunger. The ICT probe virtually eliminates this problem by bringing the barrel into contact with the plunger.



In addition to electrical performance, accuracy and durability are crucial aspects of probe performance. Correct registration of the fixture to the target is essential for successful contact. The inherent pointing accuracy of the probe is a considerable factor in the total accuracy of the system. Poor fixture to target registration causes increased side load forces on the probe, accelerating the wear of the plunger plating at the critical barrel contact surface, causing premature spring failure, and diminishing the tip and edge life.

Contamination can take the form of flux residues and particulate matter from the board production process and environment. These contaminants work their way into the internal portion of the probe and entrenched in the plunger tip, creating an insulating effect. Once the contaminants are trapped in the probe, an abrasive grit forms. This grit wears the plunger and barrel platings, and also accelerates spring failure. The probe then suffers from the inconsistently high resistance values seen during test.

The Titanium Pro Advantage

The Titanium Pro ICT Series features an improved plunger design and a corresponding new beam design. During the manufacturing process, the bifurcated beams are customized for each plunger, eliminating any manufacturing tolerance between the plunger outside diameter and the inside diameter of the beams. In the new design, the retained length of the plunger is reduced by .100" (2.54mm), allowing for a longer spring. Thus, higher forces are obtainable while eliminating the tendency for premature mechanical failure, specifically when over stroking occurs.

The Ti-Pro ICT series feature our new G2 proprietary barrel material and plating. Our G2 Barrel was designed to increase the friction force between the inside of the receptacle and the outside of the barrel. In essence, it has a "less slick" fit. As a result, **the Ti-Pro Series probes are less likely to "walk out" during test**. To further reduce probe walk out, IDI receptacles also feature 4 detents as compared to others' single detent design. In testing, the Ti-Pro Probes with G2 barrels had an extraction force 25% greater than probes manufactured with an unplated surface on the outside of the barrel.

All Ti-Pro ICT Series probes feature our new revolutionary plunger plating, with a plating hardness of 400 knoop, **over TWICE as hard as the standard cobalt gold** (180 knoop) commonly used on probes. As with all platings, it is the additives of the plating bath that determine the hardness of the electrodeposit. Through detailed design experiments, we believe we have developed the hardest electro-deposited gold obtainable. As a result, the Tri-Pro ICT Series is less susceptible to wear from side loading and is more equipped to withstand the harshness of today's In-Circuit Test environments.

These new design features make the Ti-Pro Series by far the most robust in-circuit test probe. The compliant fit between the plunger and barrel, the gentle wiping of the plunger shaft during deflection, and the harder gold plating vastly reduce wear commonly seen as a black surface on the shaft of the plunger, resulting in longer probe life. The longer spring volume, corresponding lower spring forces, and absence of grit in the internal portion of the probe all contribute to increasing mechanical spring life.

The redesigned beams, the new plunger design, the longer spring volume, the G2 barrel, the increase hardness in steel plungers and the new proprietary 400 knoop electro-deposited gold plunger plating when added to the benefits of the original ICT (improved pointing accuracy, low resistance and most consistent resistance) make the Titanium Pro ICT Series Probes the total solution to In-Circuit Test.

ICT Design Features

The ICT design is the first fundamental new probe technology that addresses the three primary aspects of performance important for In-Circuit Testing: electrical resistance, pointing accuracy, and durability.

The ICT design features a process that machines the barrel top into four bifurcated beams of precise length and profile. The beams are then coined to perfect center by a special manufacturing process. This provides a compliant pressure fit against the plunger, resulting in a zero working clearance between the plunger and barrel. This seemingly simple innovation, adapted and refined from proven pin and socket connection technology, is exceedingly effective at providing substantial performance gains.

In contrast to the single and highly variable contact point in a bias design, the bifurcated beams provide full radial contact to the plunger. This enlarged contact area never changes as the probe is compressed, always occurring at the point the plunger meets the barrel beams which results in the lowest, most consistent resistance of any probe.

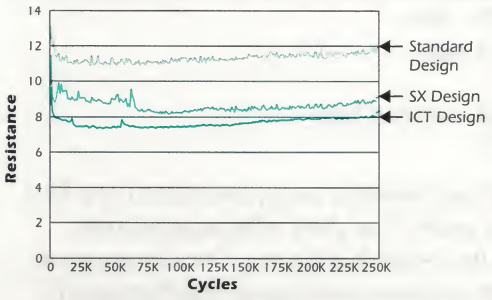
Additionally, the four bifurcated beams are coined to perfect center, positioning the plunger in axial and radial alignment with the barrel, as compared to bias designs that force the plunger off axis for electrical performance. The zero clearance between the plunger and barrel provides a self-centering of the plunger in the barrel, resulting in the best pointing accuracy of any probe. The zero clearance also closes the pathway for contamination to enter the internal portion of the probe dramatically impacting the longevity of the electrical performance and the probes' durability in contaminated environments.

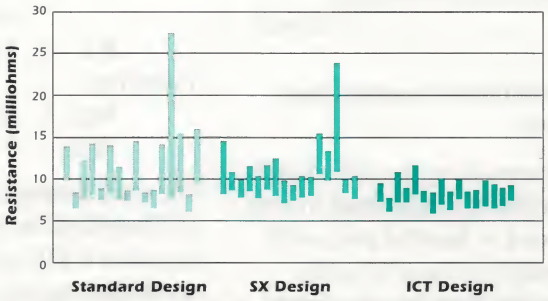
During compression, there is a light wiping force between the barrel and plunger. This wiping keeps contamination from entering the internal area of the probe, further prolong probe life. The ICT probes have a distinct feel when compressed. Compress one between your fingers. The friction you sense during deflection of the probe is normal and expected. It is your assurance that the probe is indeed providing the pointing accuracy and consistently low resistance we promise.

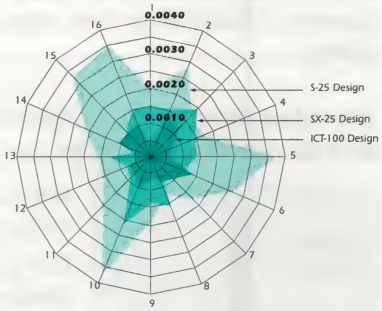
TYPICAL RESISTANCE OVER 250,000 CYCLES

POINTING ACCURACY

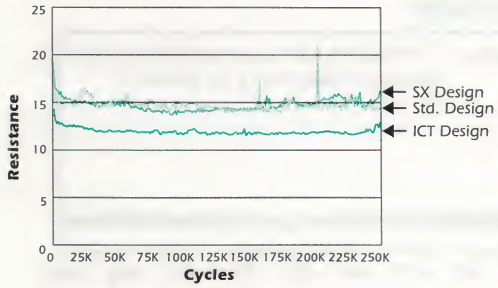
ICT-100 .100" Centers, .250" Maximum Travel - Page 44

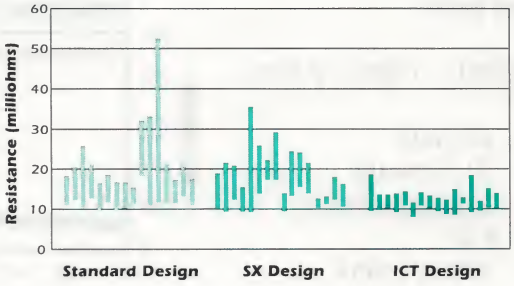


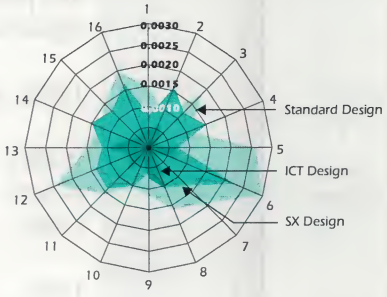




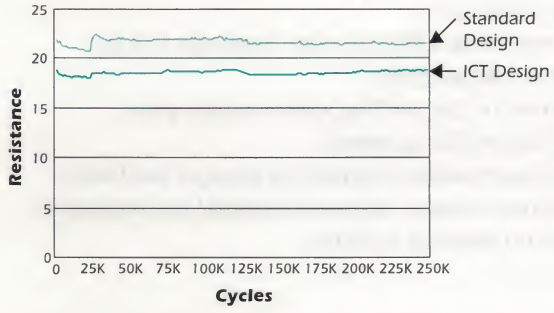
ICT-075 .075" Centers, .250" Maximum Travel - Page 45

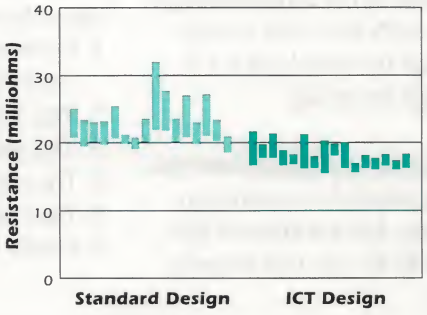


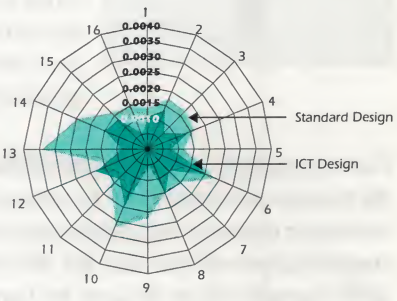




ICT-50J .050" Centers, .250" Maximum Travel - Page 46







Resistance Calculation of a Probe/Receptacle

The contact resistance of a spring contact probe/receptacle assembly is critical to successful testing. Listed below for reference are calculations of the approximate resistance of various components for a Size 25 probe.

Plunger Approximation

.040" diameter rod, .700" long Beryllium Copper base material, Gold over nickel plating ..... 1.24 mΩ

Barrel Approximation

1.000" long cylinder, 0.042" inside diameter, .054" outside diameter, DuraGold material and plating ..... 8.32 mΩ

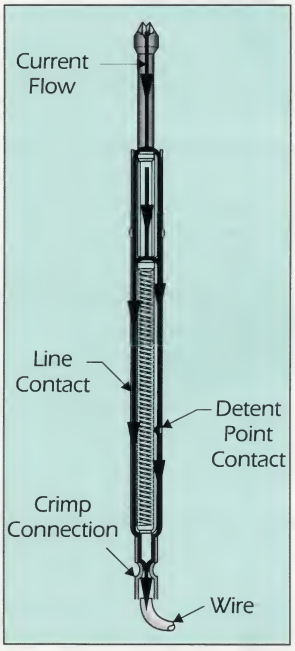
Spring Approximation

.006" wire diameter, 7.500" in length Music Wire base material, Gold over nickel plating ..... 2125.09 mΩ

Receptacle Approximation

1.200" long cylinder, .055" inside diameter, .066" outside diameter, Nickel/silver base material, Gold over nickel plating ..... 13.20 mΩ

The values listed above are approximations. However, they are sufficient for the intended purpose.



When determining the current path of the probe, it is important to note that current in parallel paths will divide itself between the paths such that the products of current and resistance in each path are equal for all paths.

$$I_{BRL} \times R_{BRL} = I_{SPG} \times R_{SPG}$$

$R_{BRL} = 8.32m\Omega$
$R_{SPG} = 2125.09m\Omega$
$I_{BRL} = \frac{2125.09}{8.32} \times I_{SPG}$
$I_{BRL} = 255.42\ I_{SPG}$

The current through the barrel is 255 times as great as the current through the spring or 99.6% of the current goes through the barrel and 0.4% goes through the spring.

For this example, we have ignored the contact resistance between the plunger and barrel, just as we have ignored the constriction resistance between the plunger and spring. The net effect of this simplification will not alter the fact that by far, the vast majority of the current will go through the barrel.

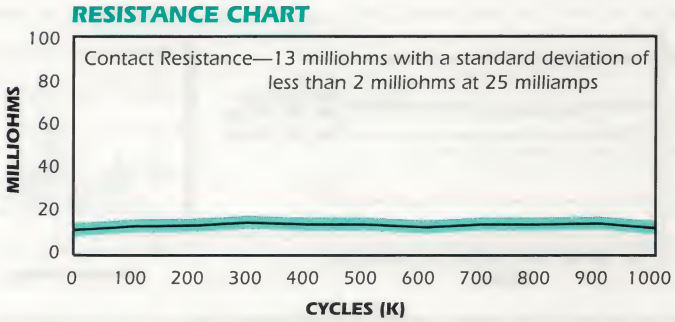
To simplify the calculation of the resistance of a probe, assume the current has traveled through the total length of the plunger and then directly to the barrel. Therefore, the plunger and barrel are in series. The current now must travel from the barrel to the receptacle. The detents in the receptacle supply a solid connection between the barrel and receptacle. The current will tend to transfer at this point. Assume all the current transfers from the barrel to the receptacle at the detents.

The plunger, barrel and receptacle are in series with each other. Therefore, Ohm's Law for resistors in series applies.

where $R(t) = R1 + R2 + R3$
where $R(t)$ = Total Resistance
$R1$ = Plunger Resistance
= 1.24 mΩ
$R2$ = Barrel Resistance for the length the current travels. For a Size 25, the current will only travel through 0.040" of the barrel resulting in a resistance of
$R2$ = 0.33 mΩ
$R3$ = Receptacle Resistance for the length the current travels. For a Size 25 this distance is .680", thus
$R3$ = 7.94 mΩ

Therefore,
$R(t) = 1.24 + 0.33 + 7.94$
$R(t) = 9.51$

The total resistance determined is an approximation of a Size 25 DuraGold Series probe. The chart reflects actual data recorded at IDI, on the 4-wire Kelvin test. Over the course of one million cycles, the resistance readings average between 13 and 14 milliohms.



It should be noted that the recorded value includes the following additional resistances:

1. Constriction resistance between the probe tip and the sterling silver contact plate.
2. The solder joint on the sterling silver contact plate.
3. The solder joint on the receptacle.
4. The constriction resistance between the plunger and barrel.
5. The constriction resistance between the barrel and receptacle.
6. Oxide layers on material surfaces.

IDI 4-Wire Kelvin Test

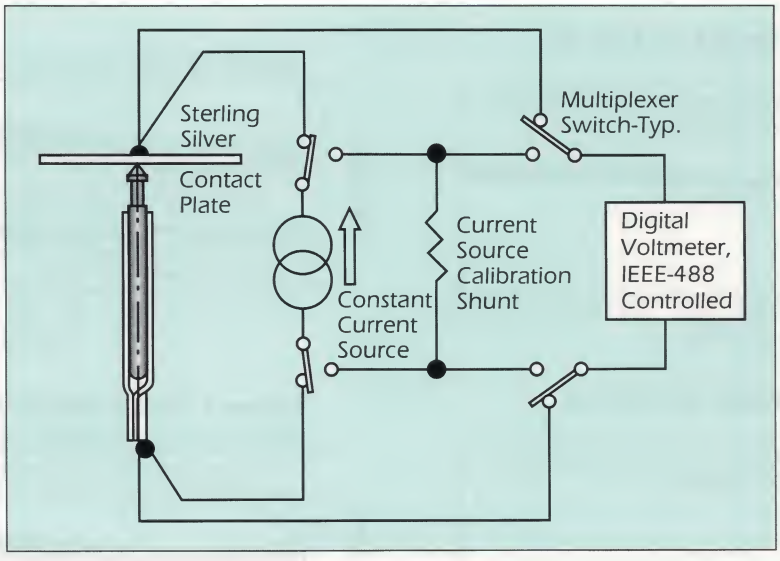
The Spring Contact Probe is a critical link in the ATE process. Without proper design, electrical and mechanical performance may be compromised. As testing becomes more complex, it is essential that probes be evaluated to determine the optimum characteristics of probe material, tolerances, plating, spring performance and plunger design. All of these items play a critical role in developing a range of products that meet the increasingly complex needs of the ATE industry and deliver the testing life to make them practical.

Test Set-up

1. Thirty-two (32) spring contact probes are installed into IDI receptacles in a manner similar to actual field use—in vertical, point up orientation, press fit following specifications into a G-10 fiberglass matrix block.
2. A machine-tool slide guided, sinusoidally-oscillated silver contact plate compresses the probes down within .001" of the rated stroke. At set-up, the mechanical stroke is verified with a built-in dial indicator.
3. A precision, 25,000 step/rev. microstepping motor cycles, stops and registers the contact plate within 0.001" of the rated stroke, and the resistances of the test samples are taken. The equipment can also determine spring failures by precision stepping movements.

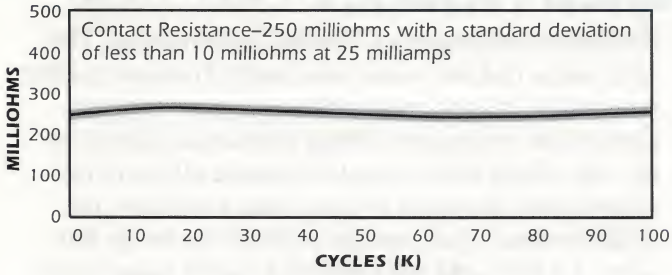
Physical Parameters

1. Resistance test employs a "4-wire" Kelvin set-up. This term means that two wires route injected constant current into and out of each probe while a separate wire pair conveys the consequent voltage drop across the test set-up. The voltage drops include resistance effects of the contact plate, the probe to plate contact interface, the probe/receptacle pair, and the solder joints for the four wires. An IEEE-488 bus controlled 10,000 mohm input impedance voltmeter reads the voltage due to 25 milliamps injected through each test specimen. To allow for settling time, readings occur at one second intervals.
2. Since the machinery cycles at a 4 Hertz rate, a half-million cycle test requires 1.5 days, stops included.
3. The current source forces a constant current checked during set-up and testing at each test interval with a precision current shunt, subject to a maximum compliance voltage of 14.75 volts.
4. Software affords flexibility during test set-up. Parameters such as cycle rate, number of cycles between resistance reading stops and spring failure stops, and the number of stops are entered as responses to computer prompts. The software also allows the unit to be hooked up to a special calibration fixture for resistance level verification. This fixture is calibrated and is traceable to the National Institute of Standards and Technology (formerly the NBS).

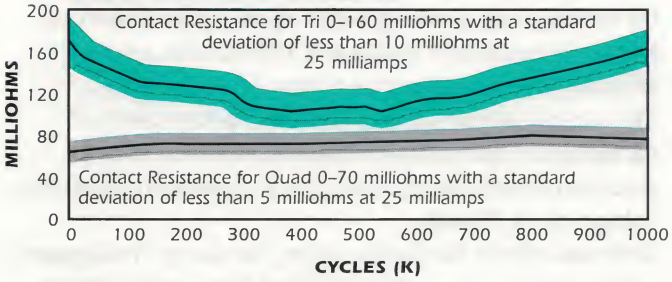


Resistance Charts

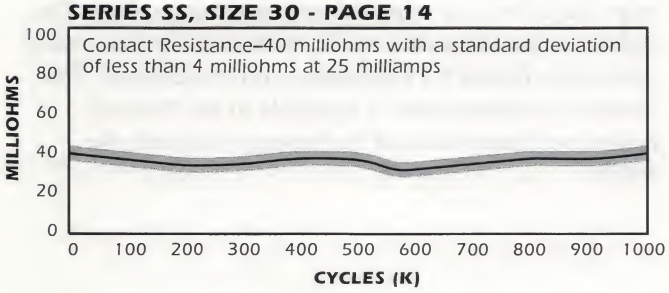
PENTA 0 - PAGE 11



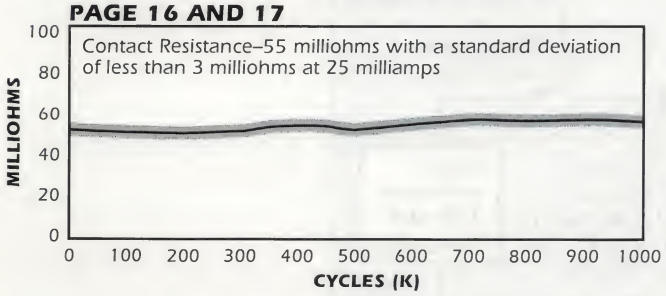
QUAD 0 & TRI 0 - PAGE 13



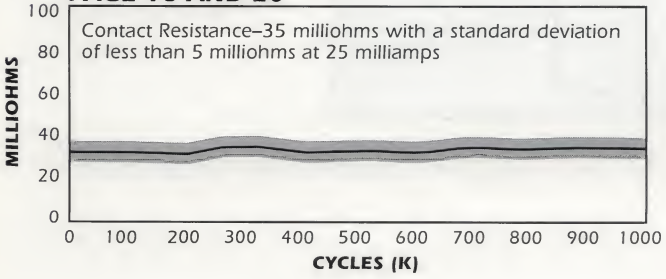
SERIES SS, SIZE 30 - PAGE 14



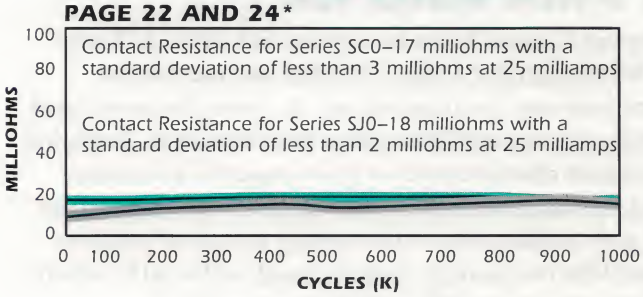
SERIES S, SIZE 00 & SERIES SS, SIZE 40 PAGE 16 AND 17



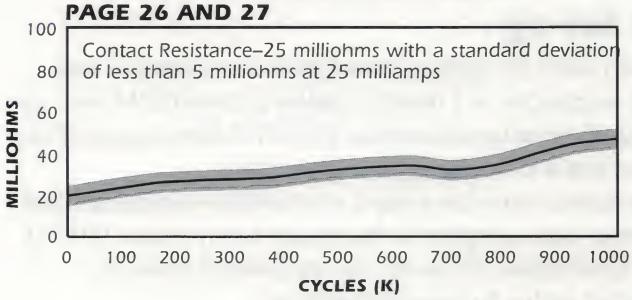
SERIES S, SIZE 0 & SERIES SS, SIZE 50 PAGE 18 AND 20



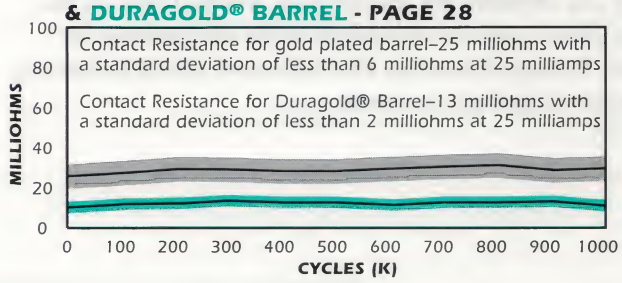
SERIES SC, SIZE 0 & SERIES SJ, SIZE 0 PAGE 22 AND 24*



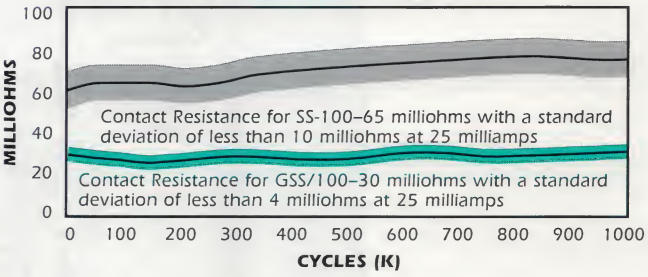
SERIES S, SIZE 1 & SERIES SS, SIZE 75 PAGE 26 AND 27



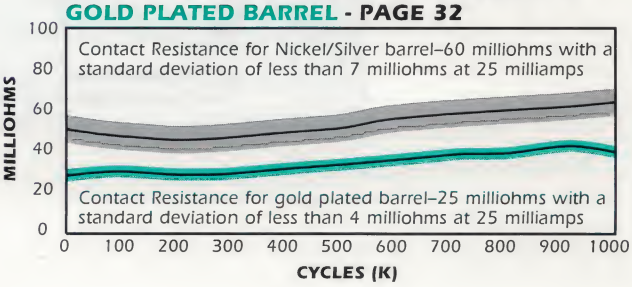
SERIES SL, SIZE 1 GOLD PLATED BARREL & DURAGOLD® BARREL - PAGE 28



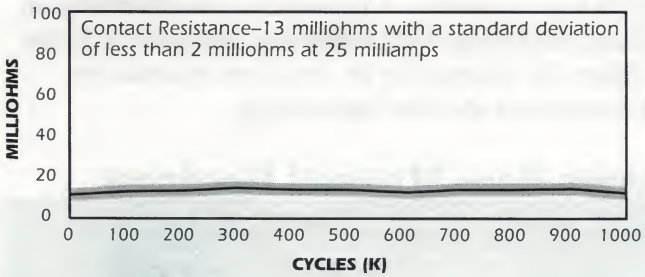
SERIES SS-100/ GSS-100 - PAGE 30



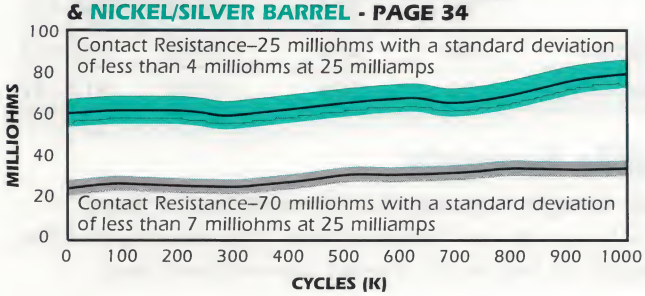
SERIES S, SIZE 2 NICKEL/SILVER BARREL & GOLD PLATED BARREL - PAGE 32



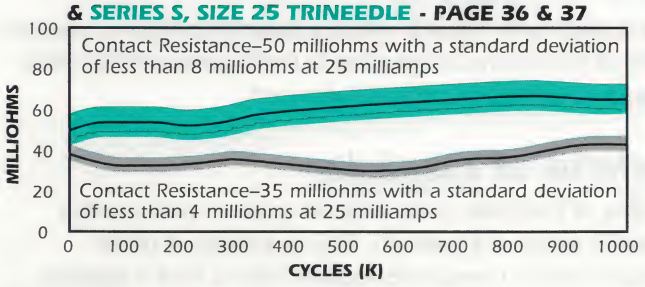
SERIES S, SIZE 25 DURAGOLD® BARREL PAGE 34



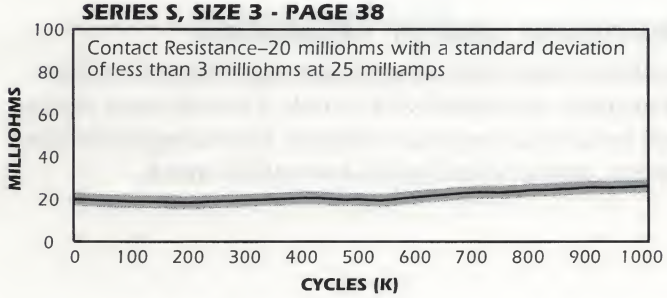
SERIES S, SIZE 25 GOLD PLATED BARREL & NICKEL/SILVER BARREL - PAGE 34



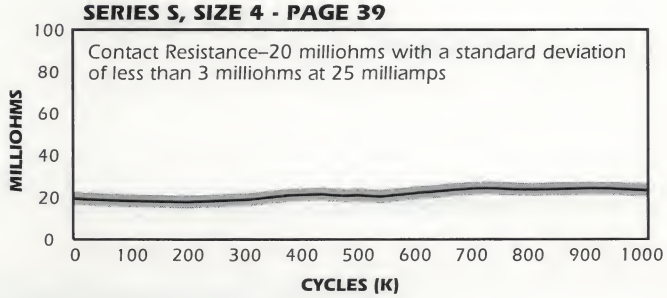
SERIES SR, SIZE 25 GOLD PLATED BARREL & SERIES S, SIZE 25 TRINEEDLE - PAGE 36 & 37



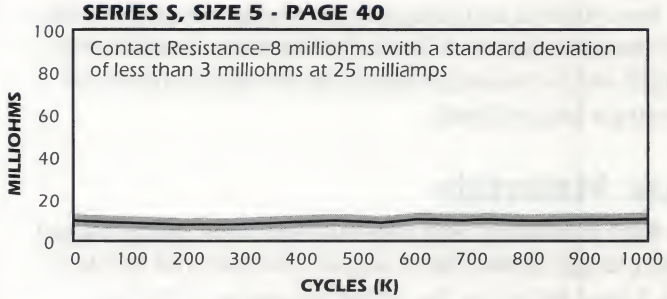
SERIES S, SIZE 3 - PAGE 38



SERIES S, SIZE 4 - PAGE 39

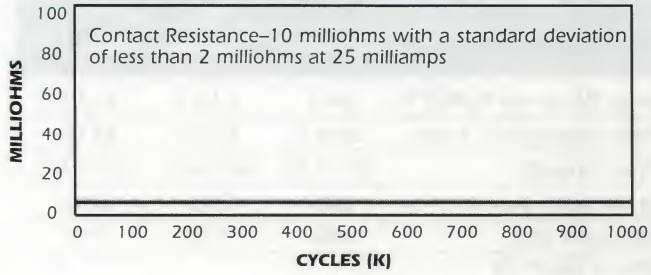


SERIES S, SIZE 5 - PAGE 40

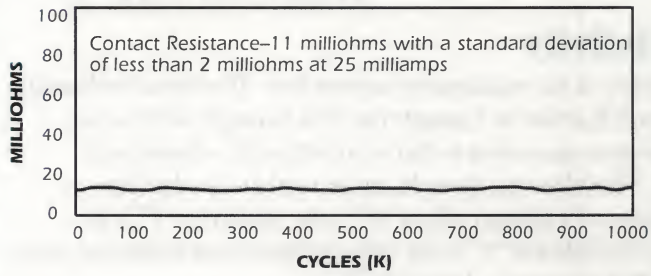


Ti-Pro ICT SERIES

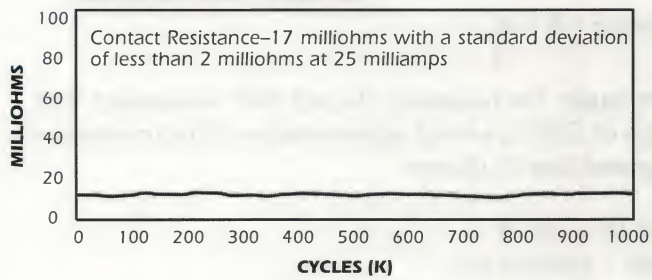
SERIES ICT-100 - PAGE 44



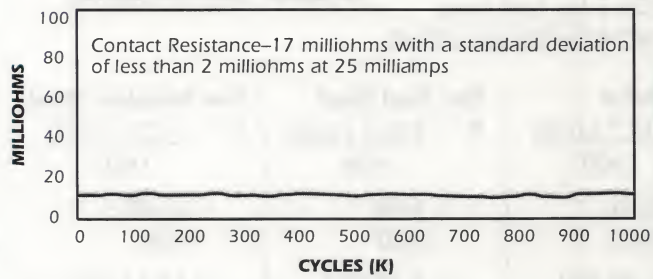
SERIES ICT-075 - PAGE 45



SERIES ICT-50J - PAGE 46



SERIES ICT-50C - PAGE 47



Plunger Materials

The base material and plating of the plunger are some of the most important factors of probe performance. Conductivity, strength and wear characteristics are the major criteria for choosing a base material.

Base Materials

The three commonly used base materials for a spring contact probe plunger are beryllium copper, tool steel and stainless steel. Listed below are the critical properties of the base materials with regard to Spring Contact Probes. Properties of the metals listed in the table and in the text are for the specific alloys used by IDI.

	BeCu	Tool Steel	Stainless Steel
Resistivity (Ω cir mil ft @20°C)	34.7	120.3	342.9
Hardness (Rockwell C scale)	36-42	50-55	48-50
Hardness (Knoop)	361-425	542-629	512-542
Tensile Strength (ksi)	200	216	230
Yield Strength (ksi)	182	152	195
Modulus of Elasticity In Tension (Mpsi)	19	30	29

Resistivity

Resistivity is the resistance to current flow. The unit of resistancy, Ω cir mil/ft, refers to a sample one foot in length with a cross section area equivalent to that of a circle with a diameter of .001". The following formula can be used to calculate the resistance of a plunger where "p" is the resistivity, "l" is the length (in feet) and "a" is the cross sectional area expressed in cir mils (.040 diameter = 1600 cir mil).

$$\text{Resistance} = R = \frac{pl}{a}$$

For example: The resistance of a rod .040" in diameter with a length of .700" is a rough approximation of the resistance of an unplated Size 25 plunger.

l = .7/12 = .058 ft
a = 40^2 = 1600 cir mil
p = 34.7 for BeCu
p = 120.3 for Tool Steel
p = 342.9 for Stainless Steel

For BeCu

$$R = \frac{34.7\ (.058)}{1600} = \frac{2.01}{1600} = 1.26\ m\Omega$$

For Tool Steel

$$R = \frac{120.3\ (.058)}{1600} = \frac{6.98}{1600} = 4.36\ m\Omega$$

For Stainless Steel

$$R = \frac{342.9\ (.058)}{1600} = \frac{19.89}{1600} = 12.43\ m\Omega$$

Hardness

Hardness is the resistance of a material to a local penetration, scratching, machining, wear or abrasion, and yielding. In the table below, the hardness for the three base materials are listed as machined and after heat-treating.

Plunger Base Material Hardness

Material	As Machined		After Heat Treating	
	Rockwell B Scale	Knoop	Rockwell C Scale	Knoop
BeCu	90	207	36-42	361-425
Tool Steel	101	272	50-55	542-629
Stainless Steel	94	228	48-50	512-542

Tensile Strength

Tensile strength is the maximum stress in tension that a material can withstand before rupture. Calculated by dividing the maximum load by the original cross sectional area.

Yield Strength

Yield strength is the stress at which a material exhibits a specified amount of permanent deformation. In tensile testing, 0.2% offset on the stress-strain curve is generally used.

Modulus of Elasticity

Modulus of Elasticity is the ratio of stress to strain within the elastic range of a material. This is a measure of the material's ability to resist deflection when a load is applied.

Corrosion and/or Oxidation

Beryllium copper and tool steel may react with the moisture and oxygenic atmosphere and corrode. Precious metal plating helps prevent base material oxidation. Depending on the alloy elements, stainless steel resists atmospheric attack.

Plunger Platings

The plungers of all probes manufactured by IDI are plated with precious metals. This ensures that:

- The base material is protected from oxidation or corrosion
- There is a clean, nonoxidized, conductive surface at the juncture between plunger and barrel, which is critical to the current path
- The overall resistance of the component is lowered by providing a less resistive current path in parallel
- The base material is protected from wear and/or abrasion

Two plunger platings are currently offered by IDI. Gold plating is the industry standard and the default plunger plating for all IDI probes except the Rotator™ series. Gold plating is well known for its resistance to corrosion, attractive cosmetic features, and low electrical resistance. Duralloy™, a proprietary plating developed by IDI, is a much harder and smoother plating than gold and provides a longer life in the aggressive design of the Rotator Probe.

The gold or Duralloy plating is deposited over a barrier layer of nickel plating. This barrier layer locks out corrosion and provides a hard undercoating for the relatively soft gold plating. In some non-standard probe configurations, nickel is the only plating applied.

IDI will certify that all of its platings comply with the following military specifications:
Gold—MIL-G-45204C
Nickel—ASTM B607, B656

The table below lists some of the critical properties of electroplated gold, Duralloy, and nickel. It should be noted that the properties of electroplated metals vary considerably depending on bath chemistry, bath impurities, current density, and additives. The information in the table below is from *The Properties of Electrodeposited Metals and Their Alloys.* This handbook, published by the American Electroplaters' and Surface Finishers' Society, consolidates data from a number of individual studies.

	Gold	Nickel	Duralloy™
Resistivity (Ω cir mil ft)	11.4-28.9	181.5-331.0	64-90
Hardness (Knoop)	160-190	500-600	930-1100
Hardness (Rockwell B)	78-86	–	–
(Rockwell C)	–	47-53	>68
Tensile Strength (ksi)	16-31	100-122	101-112

The properties of electro or electroless deposited metals vary from that of the wrought metal. The primary reason for the variation is due to the grain size of the metal as plated or wrought. Deposited metals generally feature a smaller grain size than the wrought metal. For this reason, the hardness and tensile strength of deposited metals is considerably higher than that of their wrought equivalent. Impurities and alloying elements inherent in the production of deposited metals account for their higher resistivity. The table below compares properties of deposited metals versus their wrought equivalents.

	Gold		Nickel	
	plated	wrought	plated	wrought
Resistivity (Ω cir mil ft)	11.4-28.9	14.7	181.5-331.0	50.8
Hardness (Knoop)	160-190	80	500-600	125
Hardness (Rockwell B)	78-86	35	–	70
(Rockwell C)	–	–	47-53	–
Tensile Strength (ksi)	16-31	14.9	100-122	46

Resistivity

Resistivity is defined as the electrical resistance offered by a material to the flow of current, times the cross-sectional area of the current flow and per unit length of the current path. Resistivity is the reciprocal of conductivity. A rod of pure nickel will have approximately 15 times the resistance of a rod of pure gold. However, since IDI's plungers are composed of multiple layers of different materials, the resistance of a plunger can be calculated by applying Ohm's Law for parallel resistors.

Formula 1

Ohm's Law for Parallel Resistors states:

$$R(t) = \frac{1}{1/R1 + 1/R2 + 1/R3}$$

Where
R(t) = total resistance
R1 = resistance of base material
R2 = resistance of nickel barrier layer
R3 = resistance of precious metal plating (gold or Duralloy)

Formula 2

To calculate R1, R2, and R3, the following formula applies:

$$R = \frac{pl}{a}$$

Where
p = resistivity in Ω cir mil/ft
l = length in feet
a = cross sectional area in cir mil

Expanding on the example in the previous section, we may use these two formulas to calculate the approximate total resistance of a .040" diameter rod .700" long composed of the following materials:

Base material–stainless steel
Barrier coating–150 µ inches of electroless nickel
Final coating–25 µ inches of electroplated gold

Determine the resistance of each layer using Formula 2.

Layer 1 – Stainless Steel Base Material

$$R1 = \frac{pl}{a}$$

$$R1 = \frac{342.9 \times .058}{1600}$$

$$R1 = \frac{19.89}{1600}$$

$$R1 = 12.43\ m\Omega$$

l = .700/12 = .058 ft
a = 40^2 = 1600 cir mil
p = 342.9 Ω cir mil/ft

Layer 2 – Nickel Barrier Layer

$$R2 = \frac{pl}{a}$$

$$R2 = \frac{181.5 \times .058}{24.09}$$

$$R2 = \frac{10.53}{24.09}$$

$$R2 = 437.11\ m\Omega$$

l = .700/12 = .058 ft
a = 40.3^{2-} - 1600 = 24.09 cir mil
p = 181.5 Ω cir mil/ft

Layer 3 – Gold Layer

$$R3 = \frac{pl}{a}$$

$$R3 = \frac{14.7 \times .058}{4.03}$$

$$R3 = \frac{.83}{4.03}$$

$$R3 = 205.96\ m\Omega$$

l = .700/12 = .058 ft
a = 40.35^{2-} - 40.3^2 = 4.03 cir mil
p = 14.7 Ω cir mil/ft

Using Ohm's Law, Formula 1, the resistance for a stainless steel gold plated rod can be calculated.

$$R(t) = \frac{1}{1/R1 + 1/R2 + 1/R3}$$

$$R(t) = \frac{1}{1/12.43 + 1/437.11 + 1/205.96}$$

$$R(t) = 11.42\ m\Omega$$

Therefore, by plating the stainless steel rod gold over a nickel barrier layer, the total resistance of the rod was decreased by 1.01 milliohms (approximately 8%).

Using the same procedure as above, the table below shows the total resistance of various combinations of base materials for the .040" diameter, .700" long rod.

Resistance in Milliohms				
	unplated	gold	nickel	Duralloy™
BeCu	1.260	1.249	1.256	1.252
Tool Steel	4.360	4.228	4.317	4.269
Stainless Steel	12.430	11.416	12.086	11.718

As shown in the table, the resistance of a Size 25 plunger is not significantly decreased by plating. Since resistance is dependent upon the cross sectional area, the smaller the part, the greater the decrease in total resistance from plating. A very small steel part will benefit considerably more by precious metal plating than a .040" diameter rod of beryllium copper.

Resistance to Corrosion, Wear, and Abrasion

Resistance to corrosion, wear, and abrasion is an important factor in selecting a plunger plating for a specific application. The properties of gold, nickel, and Duralloy are discussed separately below. Nickel is considered because it is used as a barrier plating under both gold and Duralloy, and in the normal use of gold plungers it is typical for the gold to be worn away and the nickel exposed.

Gold

Gold will generally not react with oxygen, sulfur, selenium, nitrogen, or carbon at any temperature. Gold will resist most acids unless oxidizing agents are present. Gold is not attacked by alkalis. In other words, the intrinsic nobility of gold prevents corrosion or oxidation of the base material.

There is conflicting data on the effect of the hardness of the gold deposit on its wear and abrasion characteristics. Some studies have found that softer gold generally wears better, perhaps because it 'smears' on the surface of the part. Other studies have found that harder gold deposits offer enhanced plating life. The contrast in these findings can be attributed to many factors including surface cleanliness, surface roughness, and surface stress.

The characteristics of the mating part also influence the abrasion performance of the plated plunger. If the probe is aggressively side-loaded or biased, wear will be increased. This wear will take place first on the side of the plunger shaft. This is critical, since this wear takes place at the exact point where current transfer is most desirable (see page 79, Contact Resistance). Plunger plating is critical to the probe's electrical performance.

Duralloy™

Duralloy is noble and is exceptionally resistant to corrosion and oxidation. It remains bright and untarnished in atmospheric exposure.

Duralloy is extremely smooth when plated and does not develop the microcracks that are typical of rhodium, the plating material Duralloy obsoleted. In addition, gold is semiporous at the thicknesses used in plating, and this porosity increases its coefficient of friction. Duralloy, by contrast, is very thick and completely nonporous. This smooth, unbroken surface greatly contributes to Duralloy's abilities to both resist corrosion and limit wear.

Duralloy is slightly more resistive than gold, and is therefore not recommended for extremely sensitive measurements.

Nickel

Nickel is used throughout the electronics industry as a barrier layer between the base metal and precious metal plating. The main reason for the nickel barrier layer is to prevent migration of the base material into the precious metal. Migration can be prevented without a barrier layer if the precious metal deposit is 0.001" (2.5 microns) as compared to 0.000025" – 0.000050" which is the current industry standard thickness range. Therefore, the nickel barrier layer is a cost effective method for eliminating migration of the base material.

Electroless nickel is uniformly distributed and is free from pores at a lesser thickness than electrodeposited nickel. Electroless nickel deposits are widely used to prevent corrosion, wear, and abrasion. Corrosion protection is provided by isolating the base material from the environment. The natural oxide layer that forms over nickel protects the deposited metal from corrosion. The alloy composition of the nickel deposit determines the rate of corrosion.

Barrel Materials and Platings

The barrel is a critical portion of the spring contact probe. The inside of the barrel must make good electrical contact with the plunger and spring, while the outside of the barrel must make good electrical contact with the receptacle. IDI offers four plating and material variations for the spring contact barrel, dependent upon size.

G2 Barrel
Series G2
Ultra-High Performance Series

The G2 plating is the result of recent advancements IDI has made in material science and precious metal plating techniques. G2 barrels represent the combination of a proprietary base material and a unique plating process. This new plating offers ultra-low resistance levels, while offering the benefits of longer shelf life and improved retention in the receptacle.

DuraGold® Barrel
Series DG
High Performance Series

Still a popular choice for ultra-low resistance levels, DuraGold marked our introduction of an advanced alloying technique. The DuraGold barrel uses a proprietary process to alloy the precious metal to the base metal prior to the forming operation. By providing a smoother and more uniform bearing surface, DuraGold virtually eliminates plating wear on the barrel's surface.

Gold Plated Barrel
Series S
Standard Series

The Series S probe is the industry benchmark from which all others are measured. The gold to gold contact design provides reliable, low resistance, cycle after cycle.

Barrel Material—Nickel/silver
Barrel Plating—Gold over nickel

Nickel/Silver Barrel
Series SE
Economy Series

For ATE users who require a more economical Spring Contact Probe, IDI has designed a reliable, cost effective alternative—the SE Series spring contact probe. Utilizing the same high quality barrel material as the standard IDI Spring Contact Probes and receptacles, the selective plating of the components offers ATE users an acceptable and economical option for testing.

Barrel Material—Nickel/silver
Barrel Plating—None

Barrel Material Properties

The Economy barrel has a base material of nickel/silver. Nickel/silver is an alloy of copper, nickel and zinc. In general, nickel/silver has excellent resistance to corrosion. Other desirable properties include high strength, ductility and ease of working by stamping, rolling or drawing.

The DuraGold barrel is a proprietary metal and plating with excellent resistance to corrosion. Other properties include good strength, plasticity and ease of working by stamping, rolling or drawing.

Gold Plated Barrels will resist most acids unless oxidizing agents are present. Gold is not attacked by most alkalis. In other words, the intrinsic properties of gold prevent corrosion or oxidation of the base material provided the plating is pore free. The wear resistance of gold is difficult to quantify. Some tests show a direct correlation between hardness and wear while other tests show no correlation. The electrical and mechanical properties of the Economy, DuraGold and Gold Plated Barrels are listed in the table below.

	Economy (nickel/silver)	Gold (plated)	DuraGold® (proprietary)	G2 (proprietary)
Resistivity (W cir mil ft)	186.5	11.4-28.9	115.5	25
Hardness (Rockwell B)	40-55	78-86	45	—
Tensile Strength (ksi)	65	16-31	60	100-122
Yield Strength (ksi)	25-27	—	27	—

Resistivity

A 1.000" long tube with an outside diameter of 0.054" and an inside diameter of 0.042" is a rough approximation of a Size 25 barrel. To calculate the approximate total resistance of the Economy and DuraGold barrel, the following formula can be used.

$$R = \frac{pl}{a}$$

Where
p = resistivity
for Economy = 186.5 Ω cir mil ft
DuraGold = 115.5 Ω cir mil ft

l = length in feet
= 1/12 = .083 ft
a = cross section area in cir mil
= $54^2 - 42^2$
= 1152 cir mil

Economy

$$R = \frac{186.5 \cdot .083}{1152}$$

$$= \frac{15.48}{1152}$$

R = 13.44 mΩ

DuraGold®

$$R = \frac{115.5 \cdot .083}{1152}$$

$$= \frac{9.59}{1152}$$

R = 8.32 mΩ

To calculate the resistance of a plated barrel, Ohm's Law for parallel resistors applies.

$$R(t) = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}}$$

See Plunger Plating Section for more information and examples of Ohm's Law (pages 111-113).

Using the above formula, the resistance for a gold plated barrel with a nickel barrier layer is listed below with the previously calculated resistances for the Economy, DuraGold and G2 barrel.

Gold Plated—12.07 milliohms
Economy—13.44 milliohms
DuraGold—8.32 milliohms
G2— 1.8 milliohms

Oxide films which form on the nickel/silver (Economy) barrels will increase the contact resistance between the barrel and the spring or plunger. This accounts for the difference in the Contact Resistance Specification published by IDI.

IDI will certify all barrels are plated to the following military specifications:

Gold—MIL-G-45204C
Nickel—ASTM B607, B656

Spring Materials and Platings

IDI uses three types of materials for springs: beryllium copper, music wire and stainless steel. Each of these materials has unique characteristics. Beryllium copper can operate at up to 205°C for 1 hour and has low resistivity and strength, thus, higher force springs can not be manufactured from beryllium copper. Music wire is used for high force springs as it has a reasonable resistance, but cannot operate at temperatures above 120°C. Stainless steel has the highest operating temperature (260°C for 1 hour), the highest resistance, and a strength between that of the other two materials.

The Spring Manufacturers Institute, Inc. is an organization in the United States and Canada which publishes a *Handbook of Spring Design*. The intent of this handbook is to use the organization's technical expertise to establish high standards in spring design and manufacturing. The table below lists the critical properties of the three base materials used for springs.

Properties of Spring Materials

	BeCu	Music Wire	SS
Resistivity (Ω cir mil ft)	34.29	150.38	342.88
Tensile Strength (ksi)	170	250	180
Hardness (Rockwell C)	35-42	41-60	35-45
Modulus of Torsion (Msi)	7.0	11.5	10.6

Information in this table is for the alloys IDI uses and may not be true for all alloys.

The operating temperature range for Spring Contact Probes is dependent upon the spring material and lubrication. IDI selectively lubricates components of the Spring Contact Probes to increase mechanical life. The table below lists the temperature range for lubricated and nonlubricated probes.

Operating Temperatures of Spring Materials

	Lubricated		Nonlubricated		
	Min.	Max.	Min.	Max. (1Hr.)	Max. (24 Hr.)
BeCu	-55°C	120°C	-55°C	205°C	120°C
Music Wire	0°C	120°C	0°C	120°C	85°C
Stainless Steel	-55°C	120°C	-55°C	260°C	180°C

It should be noted that at extreme operating temperatures mechanical life may be reduced. Prolonged exposure time significantly reduces the maximum operating temperature.

Resistivity

A wire diameter of .006" with a length of 7.5" is similar to a Size 25 spring. To calculate the resistance of the spring, the following formula can be used.

$$R = \frac{pl}{a}$$

Where p = resistivity in Ω cir mil ft
= 34.29 for BeCu
= 150.38 for Music Wire
= 342.88 for Stainless Steel
l = length in feet
= 7.5/12 = .625 ft
a = cross sectional area in cir mil
= 6^2 = 36 cir mil

For BeCu

$$R = \frac{pl}{a} = \frac{34.29\ (.625)}{36}$$

R = 595.31 mΩ

For Music Wire

$$R = \frac{pl}{a} = \frac{150.38\ (.625)}{36}$$

R = 2610.76 mΩ

For Stainless Steel

$$R = \frac{pl}{a} = \frac{342.88(.625)}{36}$$

R = 5952.78 mΩ

As can be seen, the resistance of the spring is considerably higher than that of the typical plunger (1.26 milliohms) and barrel (8-10 milliohms). In actual use, the spring carries very little of the current. It is estimated that 99% of the current travels from the plunger to the barrel. The remaining current travels through the spring. On page 106, the total resistance of the Spring Contact Probe will be theoretically calculated.

Tensile Strength and Modulus of Torsion

The tensile strength and the modulus of torsion (coefficient of stiffness) are critical in spring design. The higher the tensile strength and modulus of torsion, the higher the obtainable spring force.

Corrosion and Corrosion Resistance

Beryllium copper and music wire springs must have a protective coating to prevent corrosion. Stainless steel is primarily plated to reduce resistance.

Spring Platings

Springs are plated with either silver or gold. Silver has a high thermal and electrical conductivity. The intrinsic properties of gold prevent oxidation and corrosion. The same procedure as in the plunger section can be used to calculate the resistance of the individual layers: R1 = base material resistance, R2 = nickel barrier layer resistance and R3 = precious metal resistance. To calculate the resistance of a plated spring, Ohm's Law for parallel resistors applies.

$$R(t) = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}}$$

Where R1 = 595.31 for BeCu
= 2610.76 for Music Wire
= 5952.78 for Stainless Steel
R2 = 109.075 for nickel barrier layer
R3 = 12760 for Gold
= 9549 for Silver

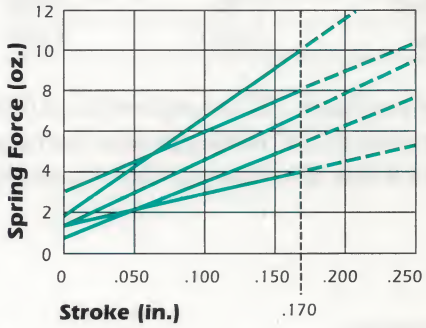
Substituting into the above formula, the resistance for the .006" diameter wire, 7.5" long has the following resistances with gold and silver platings.

IDI Springs are plated to the following military specifications:
Gold—MIL-G-45204C
Silver—MIL-QQ-S-365C
Nickel—MIL-C-26074D

	Au Plated	Ag Plated
BeCu	565.82 mΩ	557.51 mΩ
Music Wire	2125.09 mΩ	2012.39 mΩ
Stainless Steel	3913.49 mΩ	3547.61 mΩ

Spring Force vs Deflection

To determine the spring force at a deflection other than the rated travel, two different methods are available. The following graph is easily constructed, allowing the Test Engineer quick access to the approximated force. The preload force and rated travel force are supplied for all IDI probes on the catalog page. To construct a spring force graph simply plot the forces on a scaled chart and draw a straight line.



Should a more accurate force be required, the following formulas can be used:

Formula 1—Spring Force Constant

$$k = \frac{\text{Rated Force - Preload Force}}{\text{Rated Travel}}$$

Formula 2—Force at Deflection Point .xxx

F @ .xxx = k(.xxx) + Preload Force

The information in the Spring Force Box at the bottom of the page is supplied on each catalog page for all IDI probes.

Example: Find the force at a deflection of .140" for the Size 25, 4 oz. spring.

$$k = \frac{\text{Rated Force - Preload Force}}{\text{Rated Travel}}$$

$$= \frac{4 - 1.5}{.170}$$

$$= \frac{2.5}{.170}$$

k = 14.71 oz./in

F @ .140 = k(.140) + Preload Force
= 14.71 (.140) + 1.5
= 2.1 + 1.5
= 3.6 oz. at .140 deflection

Spring Force @ .170 (4,32) Travel oz. (gm)	Preload Spring Forces oz. (gm)
4.0 (113)	1.5 (42)
5.5 (156)	0.9 (25)
6.7 (190)	1.5 (42)
8.0 (227)	2.8 (80)
10.0 (283)	1.8 (512)

Receptacle Materials and Platings

The base material of the receptacle is typically nickel/silver with the exception of the Size SC0, and Size SJ0 which have a base material of beryllium copper. Listed in the table below are the critical properties of the two base materials.

	Nickel/Silver	BeCu
Resistivity (Ω cir mil ft)	186.5	34.7
Hardness (Rockwell B)	40-55	68-90
Tensile Strength (ksi)	65	75-88
Yield Strength (ksi)	25-27	60-88

The resistance of a cylinder 1.2" in length with a 0.066" outside diameter and a 0.055" inside diameter is a rough approximation for a Size 25 receptacle. To calculate the resistance:

$$R = \frac{pl}{a}$$

Where p = resistivity
l = length in feet
= 1.2/12 = .100 ft
a = cross sectional area in cir mils
= $66^2 - 55^2$
= 1331 cir mils

For Nickel/Silver

$$R = \frac{pl}{a} = \frac{186.5 \cdot .100}{1331}$$

R = 14.0 milliohms

For BeCu

$$R = \frac{pl}{a} = \frac{34.7 \cdot .100}{1331}$$

R = 2.6 milliohms

There is a significant difference in resistance between beryllium copper and nickel/silver. In addition, beryllium copper is harder and stronger than the nickel/silver. It is for these reasons IDI manufactures the SJ0 and SC0 Series receptacles from beryllium copper. All remaining receptacles do not require this strength and are made of nickel/silver. The ease of cold working and extruding makes nickel/silver a desirable, cost effective choice of material. In addition, nickel/silver has excellent resistance to corrosion.

Receptacles are often plated gold. The intrinsic properties of gold, resistance to corrosion and oxidation as well as its high thermal and electrical conductivity, make gold an ideal choice for this application.

Listed below are the critical properties of gold.

Resistivity (Ω cir mil ft)	11.4-28.9
Hardness (Rockwell B)	160-190
Tensile Strength (ksi)	16-31

(These properties apply only to the electrodeposited metals used by IDI.)

To calculate the resistance of the plated cylinder 1.2" in length with an outside diameter of 0.066" and an inside diameter of 0.055", Ohm's law for parallel resistors applies.

$$R(t) = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}}$$

Where R(t) = Total Resistance
R1 = Base Material Resistance
R2 = Nickel Barrier Layer Resistance
R3 = Precious Metal Resistance

For a detailed example on the use of Ohm's Law see Plunger Platings, on page 111-113. The values calculated by substituting into the above formula for the plated cylinders are listed below.

Nickel/Silver
Unplated 14.0 mΩ
Gold Plated 13.2 mΩ

Beryllium Copper
Unplated 2.6 mΩ
Gold Plated 2.57 mΩ

Gold will resist forming oxides, sulfides and other corrosion products and, since gold has a low resistivity, it has been an ideal choice for the electronics industry.

IDI receptacles are plated according to the following military specification:

Gold—MIL-G-45204C

SX Probe

The SX Probe is designed to minimize angular play in spring contact probes. The SX Probe is dimensionally equivalent to that of its standard counterpart series. The only difference is the diameter at the top of the barrel has been reduced in a secondary operation. The effect of the reduced diameter results in better pointing accuracy. Pointing accuracy is improved by a minimum of 50%.

There are two variables that are critical to pointing accuracy:
1. The maximum angle of the plunger.
2. The point at which the centerline of the plunger crosses the centerline of the barrel.

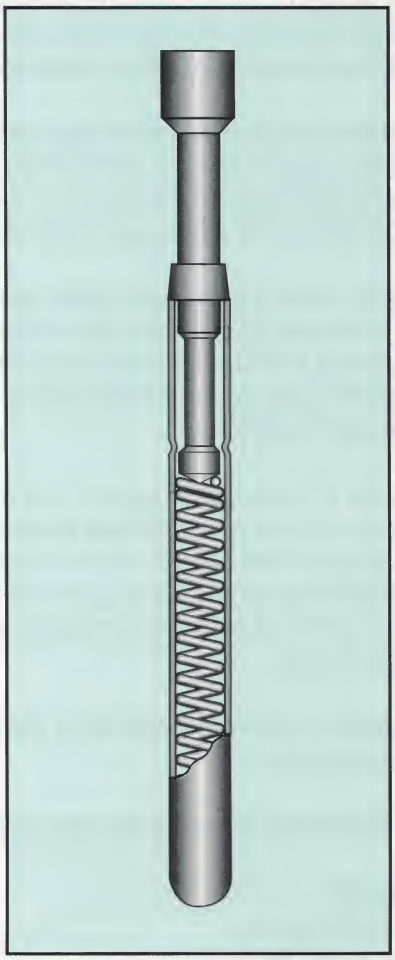
Reducing the angle and shifting the intersection of the centerlines is achieved during the secondary operation (SXing).

An additional benefit of the SX Probe is the protection it provides from contaminants entering the internal portion of the probe. Since the working clearance between the plunger and barrel has been significantly reduced, the area where contaminants could enter the probe has been significantly reduced.

The SX Probe is available as a standard option in the following sizes:

Size 0 – page 18
.050 (1,27) centers, .100 (2,54) travel
Size SS-50 – page 20
.050 (1,27) centers, .050 (1,27) travel
Size 1 – page 26
.075 (1,91) centers, .100 (2,54) travel
Size SS-75 – page 27
.075 (1,91) centers, .050 (1,27) travel
Size SL-1 – page 28
.075 (1,91) centers, .250 (6,35) travel
Size 2 – page 32
.100 (2,54) centers, .160 (4,06) travel
Size 25 – page 34
.100 (2,54) centers, .250 (6,35) travel

SX Probe



RX Receptacle

The RX Receptacle has been developed for better pointing accuracy. The design of the RX Receptacle minimizes angular misalignment of the receptacle in the mounting hole without sacrificing the strength of the receptacle.

The RX Receptacle has an alignment bulge below the press ring that is slightly smaller than the recommended mounting hole. The long gradual taper of the alignment bulge insures that the RX Receptacle self-aligns upon insertion.

In a comparison to the conventional double press ring design, the RX Receptacle provides 20% greater strength against bending and provides for improved pointing accuracy. The mounting hole for the RX Receptacle is identical to that of the standard receptacle.

For insertion, the RX Receptacle can be used without special tooling; however, for best results IDI has available a special insertion tool to insure the integrity of the receptacle. Once the bulge of the RX Receptacle has aligned with the mounting hole, place the insertion tool into the receptacle and tap lightly on the tool with a mallet.

The RX Receptacle material and plating are identical to the standard IDI receptacles.

Presently, the RX Receptacle is available in the following sizes:

Size 0 – page 18
.050 (1,27) centers
Size SS-50 – page 20
.050 (1,27) centers
Size 25 – page 34
.100 (2,54) centers

RX Receptacle

Pointing Accuracy

Surface Mount Technology (SMT) has changed and will continue to change electronics manufacturing. As pad size has decreased the demand for improved pointing accuracy has increased. In this section, a thorough explanation of probe pointing accuracy and the interrelationship between pointing accuracy and pad size (target size) is discussed.

The pointing accuracy of a probe can be divided into three categories.

- Probe pointing accuracy
- Probe/receptacle concentricity
- Receptacle/mounting hole concentricity

Probe Pointing Accuracy

Probe pointing accuracy is defined as the variation in the actual location of the probe tip from test to test and is internal to the probe. Probe pointing accuracy is influenced by the following factors:

- Straightness of the Plunger
- Maximum Working Clearance between Plunger and Barrel
- Retained Length of Plunger
- Extended Length of Plunger
- Probe Design

Until recently, all probes were designed with an inherent bias to ensure positive electrical contact between the plunger and barrel. As a result, the bias probe's design forces the probe to worst case pointing accuracy by default.

The SX design, with a reduced clearance at the top of the barrel, improves pointing accuracy of a bias design by reducing the allowable angle at which the plunger sits in the barrel. The new ICT™ Series eliminates biasing completely. The bifurcated beams at the top of the barrel force the plunger to perfect center, without sacrificing positive electrical contact. For more information on the ICT Series, see pages 104-105.

The formula below is a simplified version of calculating pointing accuracy for spring contact probes.

$e = \pm c\,(a/b + 0.5)$

where e = pointing accuracy
c = max. working clearance (barrel ID–plunger OD)
a = extended length of plunger
b = retained length of plunger

For Example:
Size S25, .250 stroke has
$c = .002$
$a = .330$
$b = .335$

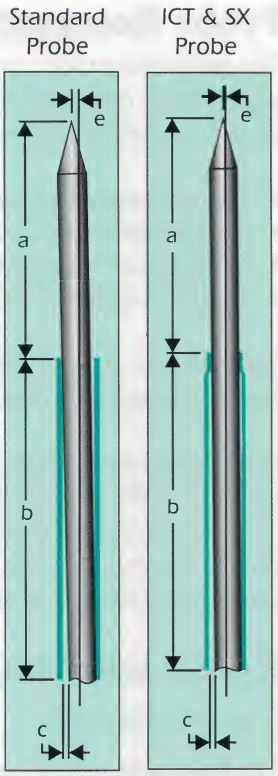
therefore:
$e = \pm 0.002(.330/.335 + 0.5)$
$= \pm 0.002(.9851 + 0.5)$
$= \pm 0.002(1.4851)$
$= \pm 0.003$"

To calculate the pointing accuracy of an SX Probe, use the following formula:

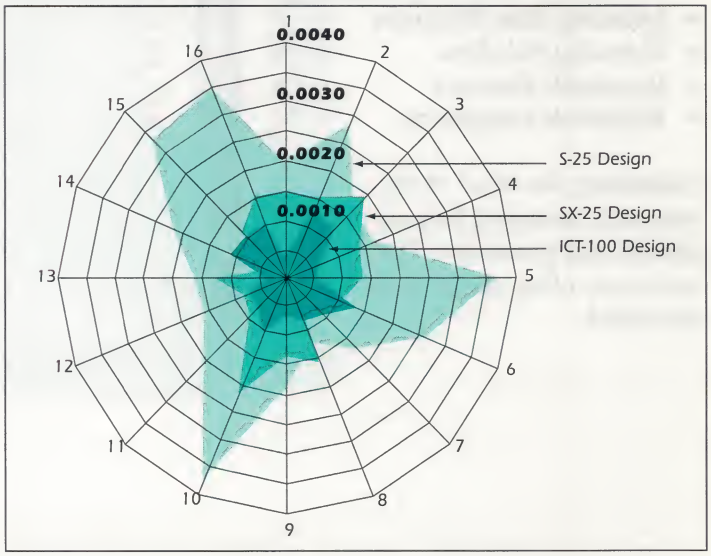
$e = \pm c(.625\ a/b + .125)$
$= \pm .002(.625(.330/.335)+.125)$
$= \pm .002(.625 \bullet .9851 + .125)$
$= \pm .002(.6159 + .125)$
$= \pm .002(.7407)$
$e = \pm .0015$"

For the ICT Probe, pointing accuracy is calculated using the following formula:

$e = 1/2c(a/b)$
$= 1/2(.0016)(330/.232)$
$= .0008(1.422)$
$= .0011$



Actual Measurements for 16 probes of Size 25 Standard Design, SX Design and ICT Design.



Probe Receptacle Concentricity

The probe/receptacle concentricity is defined as the offset or angle, which occurs when the probe rests inside the receptacle. The factors influencing this dimension are as follows:

- Barrel Outside Diameter
- Receptacle Inside Diameter
- Straightness of the Receptacle
- Detent Location and Design

Typically, the clearance between the outside diameter of the barrel and the inside diameter of the probe is 0.001".

In a single detent design, the probe is pushed off-center to one side of the receptacle. This results in a .0005" offset from the centerline of the receptacle. In the four detent design, the detents which are 90° offset from each other, center the probe in the receptacle.

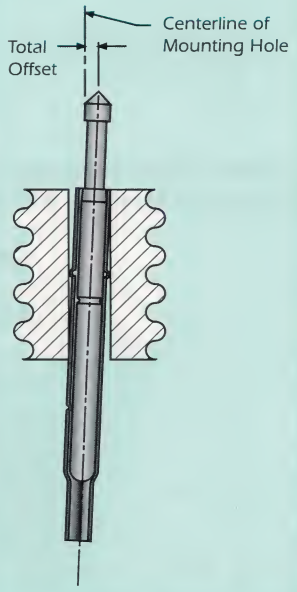
Receptacle/Mounting Hole Concentricity

The receptacle/mounting hole concentricity is defined as the offset that occurs when the receptacle is press fit into the mounting hole. Factors that influence the receptacle/mounting hole concentricity are as follows:

- Mounting Plate Thickness
- Mounting Hole Size
- Receptacle Diameter
- Receptacle Straightness

Calculating the offset of the receptacle/mounting hole is a complicated procedure. The worst case offset can be easily calculated.

Receptacle Offset



Step 1

The first step is to determine the maximum retained length of the plunger below or above the centerline of the press ring. Using the figure below,

If Y1 ≥ Y2, then

Press Ring Location (PRL)
- Ext. Length of the Receptacle (ELR)
= Max. Retained Length (MRL)

If Y2 > Y1, then

Mounting Board Thickness (MBT)
+ Press Ring Location (PRL)
- Ext. Length of Receptacle (ERL)
= Max. Retained Length (MRL)

Maximum Retained Length

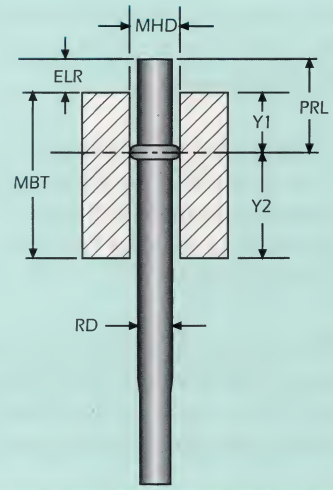
RD– Receptacle Diameter

MBT– Mounting Board Thickness

ELR– Extended Length of Receptacle

MHD–Mounting Hole Diameter

PRL– Press Ring Location



For Example:
The Size 25 receptacle has a press ring location of .300" from the top of the receptacle to the bottom of the press ring. Typically, press rings are .030" in length. Therefore, the centerline location of the press ring is .285". If the Mounting Board Thickness (MBT) is .375", then Y1 ≥ Y2 as long as the extension length does not exceed .0975" [PRL – (MBT/2)].

Using the appropriate formula from above, the Maximum Retained Length (MRL) has been calculated for various Extended Lengths of Receptacles (ELR).

Maximum Retained Length

ELR	Formula	MRL
flush	Y1≥ Y2	.285
.050	Y1≥ Y2	.235
.100	Y2> Y1	.190
.150	Y2> Y1	.240
.200	Y2> Y1	.290
.250	Y2> Y1	.340

Values in this table are for R25 Receptacles

Mounting Board Thickness—.375, Press Ring Location—.285

Step 2

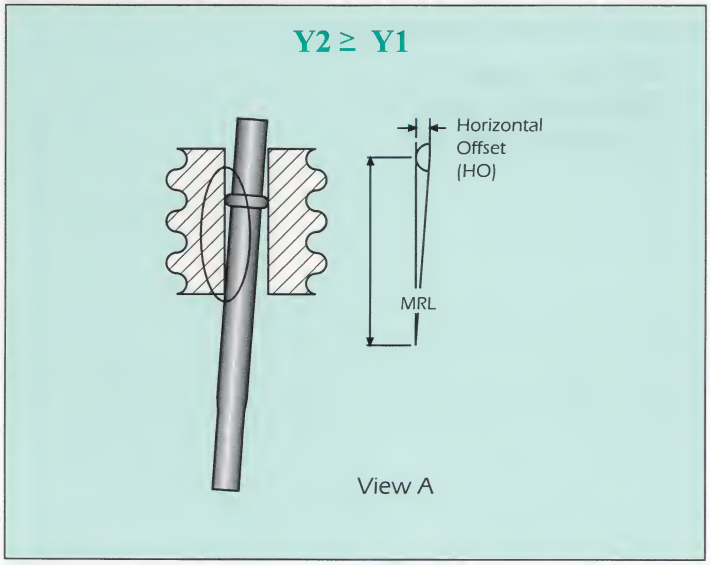
The second step is to determine the horizontal offset (HO) of the receptacle in the mounting hole. This is calculated by multiplying the difference between the press ring diameter (PRD) and the mounting hole diameter (MHD) by one-half. Then subtracting that value from the difference between the press ring diameter and the receptacle diameter (RD) multiplied by one-half.

HO = 1/2 (PRD – RD)
- 1/2 (PRD – MHD)
Horizontal Offset

Simplifying
HO = 1/2 (MHD – RD)

For the R-25 receptacle,
Press Ring Diameter, PRD = .071"
Mounting Hole Diameter, MHD = .068" to .070"
Receptacle Diameter, RD = .066"

Therefore:
For .068" diameter mounting hole
HO – 1/2 (.068 - .066) = .001"
For .070" diameter mounting hole
HO = 1/2 (.070 - .066) = .002"



Step 3

The third step is to determine the maximum angle at which the receptacle can be offset in the mounting hole. This can be calculated using right triangles.

The table following lists the angle (θ) for the minimum and maximum horizontal offsets (HO) at the maximum retained lengths (MRL) listed in the previous table. The formula used to calculate the angle is:

TAN θ =HO/MRL

ELR	HO	MRL	θ
flush	.001	.285	0.201°
flush	.002	.285	0.402°
.050	.001	.235	0.244°
.050	.002	.235	0.488°
.100	.001	.190	0.302°
.100	.002	.190	0.603°
.150	.001	.240	0.239°
.150	.002	.240	0.477°
.200	.001	.290	0.198°
.200	.002	.290	0.395°
.250	.001	.340	0.169°
.250	.002	.340	0.337°

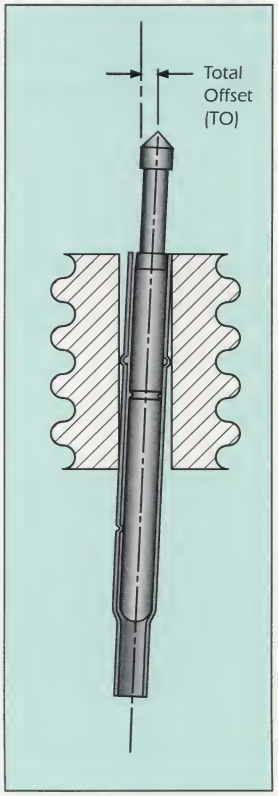
ELR—Extended Length of Receptacle
HO—Horizontal Offset
MRL—Maximum Retained Length

Step 4

Once the angle of the receptacle in the mounting hole has been determined, the fourth step is to determine offset of the probe tip from the center line of the mounting hole. The total offset (TO) of the probe tip from the center line of the mounting hole can be calculated using the following formula:

TAN θ = TO / TE

Where
TE = total extension from the press ring to the tip of the probe.
TE = PRL + Extended length of the plunger
= .285 + .330
= .615



Using the information in the table below, the TO has been calculated for the angles determined in Step 3. This information indicates that to minimize angular misalignment of the receptacle in the mounting hole:

- The smallest possible mounting hole should be used to minimize the horizontal offset of the receptacle in the mounting hole.
- Increasing the maximum retained length available will always minimize the misalignment.
- Since the maximum retained length (MRL) is critical to the misalignment, it is important to note the effect of the mounting board thickness (MBT).
- Increase Mounting Board thickness to decrease Total Offset
- Decrease Mounting Board thickness to increase Total Offset

ELR	HO	MRL	θ	TO
flush	.001	.285	0.201°	.0022
flush	.002	.285	0.402°	.0043
.050	.001	.235	0.244°	.0026
.050	.002	.235	0.488°	.0052
.100	.001	.190	0.302°	.0032
.100	.002	.190	0.603°	.0065
.150	.001	.240	0.239°	.0026
.150	.002	.240	0.477°	.0051
.200	.001	.290	0.198°	.0021
.200	.002	.290	0.395°	.0042
.250	.001	.340	0.169°	.0018
.250	.002	.340	0.337°	.0036

Worst Case Tolerance Build-Up

All three characteristics which affect the pointing accuracy of the probe have been calculated for the Size 25.

- Probe Pointing Accuracy = ± .003" (57.69%)
- Probe/Receptacle Concentricity = ± .0000" (0%)
- Receptacle/Mounting Hole ± .0022" (42.31%)*

* Flush mounted, minimum horizontal offset

Total Pointing Accuracy
= ± .003 + .000 + .0022
= ± .0052 (100%) (worst case)

Probes and Receptacles for Improving Total Pointing Accuracy

Analyzing the distribution of Pointing Accuracy for the Size 25 Probe, .250" stroke, it is found that 42% of the total misalignment is contributed to the receptacle mounting and 58% to the probe pointing accuracy. The percentages will vary with the probe size and style.

The table on the next page details pointing accuracy for standard, SX and ICT probe designs for various sizes. Also included is the standard and RX receptacles effect on pointing accuracy. For more information on:

SX Probes—page 119
RX Recptacles—page 120
ICT Probes—page 104

Comparison of Combined Pointing Accuracy

Probe Series	Probe Design	Receptacle Design	Page	Category 1 Probe	Category 2 Probe in Receptacle	Category 3 Receptacle Mounting Hole	Combined Worst Case
Size 0	Standard	Standard	18	.0014 (0,036)	.0005 (0,013)	.0012 (0,031)	.0031 (0,079)
.050" Centers	Standard	RX	18	.0014 (0,036)	.0005 (0,013)	.0000 (0,0)	.0019 (0,048)
.100" Travel	SX	Standard	18	.0007 (0,018)	.0005 (0,013)	.0012 (0,031)	.0024 (0,061)
	SX	RX	18	.0007 (0,018)	.0005 (0,013)	.0000 (0,0)	.0012 (0,031)
ICT-50J & Size SJ0	Standard	Standard	21	.0024 (0,061)	.0000 (0,0)	.0022 (0,056)	.0048 (0,122)
.050" Centers	ICT-50J	Standard	46	.0008 (0,020)	.0000 (0,0)	.0022 (0,056)	.0030 (0,076)
.250" Travel							
ICT-50C & Size SC0	Standard	Standard	21	.0024 (0,061)	.0000 (0,0)	.0022 (0,056)	.0048 (0,122)
.050" Centers	ICT-50C	Standard	46	.0008 (0,020)	.0000 (0,0)	.0022 (0,056)	.0030 (0,076)
.250" Travel							
Size 1	Standard	Standard	26	.0034 (0,086)	.0000 (0,0)	.0011 (0,028)	.0045 (0,114)
.075" Centers	SX	Standard	26	.0017 (0,043)	.0000 (0,0)	.0011 (0,028)	.0028 (0,071)
.100" Travel							
ICT-075 & Size SL1	Standard	Standard	28	.0026 (0,066)	.0000 (0,0)	.0032 (0,081)	.0058 (0,147)
.075" Centers	SX	Standard	28	.0013 (0,033)	.0000 (0,0)	.0032 (0,081)	.0045 (0,114)
.250" Travel	ICT-075	Standard	44	.0011 (0,027)	.0000 (0,0)	.0032 (0,081)	.0043 (0,109)

All dimensions are in inches (millimeters).

Probe Series	Probe Design	Receptacle Design	Page	Category 1 Probe	Category 2 Probe in Receptacle	Category 3 Receptacle Mounting Hole	Combined Worst Case
ICT-100 & Size 25	Standard	Standard	34	.0030 (0,076)	.0000 (0,0)	.0032 (0,081)	.0062 (0,158)
.100" Centers	SX	Standard	34	.0015 (0,038)	.0000 (0,0)	.0032 (0,081)	.0047 (0,119)
.250" Travel	ICT-100	Standard	42	.0011 (0,027)	.0000 (0,0)	.0032 (0,081)	.0043 (0,109)
	Standard	RX	34	.0030 (0,076)	.0000 (0,0)	.0032 (0,081)	.0062 (0,158)
	SX	RX	34	.0015 (0,038)	.0000 (0,0)	.0032 (0,081)	.0047 (0,119)
	ICT-100	RX	42	.0009 (0,023)	.0000 (0,0)	.0032 (0,081)	.0041 (0,104)

All dimensions are in inches (millimeters).

Minimum Required Total Pointing Accuracy

Knowing the Total Pointing Accuracy (probe/receptacle/mounting hole) is useful information in determining the ability of the probe to accurately hit the target. However, tolerance build-up in the fixture and component placement also affect the probe's ability to hit the target.

Typical PCB and Fixture Tolerances

- Pad Size ± 0.002"
- Pad Location ± 0.003"
- Effect of Angle of Drilled Socket Hole ± 0.003"
- Tooling Hole Size ± 0.003"
- Tooling Hole Pin ± 0.0005"
- Worst Case Tolerance Build-Up ± 0.0115"

Typical Probe Mounting Tolerance

- Probe Location to Tooling Hole ± 0.003"

The following formula determines the required total pointing accuracy needed to accurately probe with fixture tolerances considered.

Minimum Required Target Size (MRTS)
Total Pointing Accuracy (TPA) = ±0.0100
Target Location Tolerance (TLT) = ±0.0115
Probe Mounting Tolerance (PMT) = ±0.0030

MRTS = TPA + TLT + PMT
= 0.0100 + 0.0115 + 0.0030
= ±0.0245
= 0.049 diameter pad

The Total Pointing Accuracy Figure can be changed to accommodate the style of probe being used. The figure of 0.010" was chosen for demonstration purposes only.

If the target size is known, then the formula to determine the minimum required total pointing accuracy of a probe is:

TPA = (1/2 x MRTS) - TLT - PMT

For a pad size of .035", the required total pointing accuracy would be:

TPA = (0.5 x 0.035) - 0.0115 - 0.003
TPA = ± 0.0030"

In Memoriam

Therese Dawn Manweiler

1961-2000

On Saturday, January 29, 2000, IDI lost a valued employee and friend, Therese Manweiler, our talented and honored art director. The catalog you are holding in your hands was one of Therese's last projects. This catalog exemplifies Therese's body of creative work: form and function in perfect balance; eye-catching, compelling graphics that stimulate the imagination; page layout that helps the reader easily navigate through a wealth of information; an intelligent use of new graphic technologies; and the highest production values possible.

Her passing was a difficult loss for all of us at IDI. We dedicate this catalog and sourcebook to her memory to express, in some small way, how highly we regarded her friendship. Her warmth, compassion and creative talent touched so many of her associates. We are capable engineers, but it was Therese who patiently instructed us how to communicate our concepts clearly to our customers. In remembering Therese, IDI President Ed Schifman said, "Her achievements are recorded in so many different ways — her legacy of technical expertise, integrity, frankness and courage for the things she believed in, and a value system that was self-evident. She was a woman we will not forget. Our collective memories will continue to remind us of her special presence in our lives, even if it wasn't for long enough."

Therese's pride and joy was her family — two beautiful daughters Rebeka, age 4, and Rachel, age 1, and Jerry, her loving, dedicated husband. Their photographs, professionally taken by Therese herself, adorned her office and even her screen saver. We thank her family for sharing Therese with us. She has created a powerful and positive identity for this company that will leave its mark for many years to come.